



FRIDAY, AUGUST 9

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Contributions.

Height of the Conemaugh and Juanita Floods.

Pennsylvania Railroad Co.,
PHILADELPHIA Aug. 2, 1889

TO THE EDITOR OF THE RAILROAD GAZETTE:

I see in your issue of Aug. 2 a letter from W. Howard White on the subject of the heights of the Conemaugh flood. In order to satisfy him and some of the rest of your readers who have been making inquiries of the same kind, I give below actual elevations taken since the flood, the figures showing height in feet above the level of the sea:

	Low water mark.	Flood of May 31-June 1.	Top of rail, main track, Penn. R.R.
South Fork bridge	1461.0	1501.0	1486.5
500 ft. east of big viaduct	1432.0	1471.5	1457.0
West end of viaduct	1381.0	1400.0	1455.7
Bridge No. 6 (east of Conemaugh)	1267.0	1307.0	1311.7

Mr. White will note that notwithstanding the fact that "the height of the water in the stream seems to have been surprisingly small for the destruction effected," yet it averaged *forty feet* for all that. At the Big Viaduct, the point marked "B" in his diagram, the water ran over the top of the viaduct as shown by the drift-wood on the trees on the up-stream side of the viaduct, and at this point the water was 79 ft. deep. In the Juniata Valley, at Vandevanders Stone Bridge, the top of the bridge is 38 ft. above low-water, and the high-water was 2 ft. deep on top of the coping, the whole bridge being submerged. At Manayunk, Mayes and Granville Bridges, the water rose to an average of 5 ft. above the lower chord, this year's flood in the Juniata being on an average of 22 ft. above ordinary high-water, and from 8 to 9 ft. higher than any other flood we have any record of. The Juniata flood was not complicated by the breaking of dams or anything of that nature.

WM. H. BROWN, Chief Engineer.

The Adams Journal Box.

BOSTON & ALBANY RAILROAD,
ALLSTON, Mass., July 27, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have just read in your issue of this week an article on hot boxes. We do not profess to know much about this matter, but it occurred to me that it is an important one, and much more so than is generally admitted by the majority of men in charge of rolling stock. You say it is known that there are boxes that are tight and exclude dust; that is so, and the one referred to as in use by Mr. Lauder is one of them. That box is tight, and will run a long time without attention, but it is expensive and requires a special journal.

I send you a cut of another one.* This box is practically tight and no dust can get to the journal. It is applicable to the M. C. B. journal and also to one $4\frac{1}{2}$ in. in diameter, both of which we use. The same box fits either, the only change being in the brass; length over all is the same in both, and either will go in the same truck. Of course, the covers must be tight, but fitted as they should be, and as is done here, no trouble will occur from this. The cover should be planed to fit, and fastened securely. We use the Fletcher cover, and have no trouble in keeping it tight.

I have now in the shop a car that has run 77,000 miles. There is not the slightest indication of grit or dirt in the waste, and the brasses look as if good for 50,000 miles more. They are worn perfectly true, both ends are of equal thickness, and there is no end wear at all. These boxes do not get hot, and we are putting them on all new cars and on old ones as rapidly as practicable. The first application in passenger service was on an express car that is always heavily loaded, and runs between Boston and Chicago regularly. It ran 15 months without heating, and then came to shop to be cleaned up and repaired. Of course the journals were then looked after, and the car went out good for another year or more. This box is cheap, costing perhaps \$5 a car more than the common style. Of course we want a moderate royalty for its use.

F. D. ADAMS.

[In the communication on "Hot Boxes" printed last

* See page 524.

week the record of the L., S. & M. S. car should have read "6,264 miles to 1 pint of oil."—EDITOR RAILROAD GAZETTE.]

Locomotive Balancing.

BY W. H. BOOTH, M. AM. SOC. C. E.

When one considers that the centrifugal force of a revolving balance weight varies as the square of the rate of revolution, it becomes easy to comprehend the serious consequences which may ensue from the use of counterbalance for pistons and other horizontally moving parts as well as for purely revolving weights. It is not a fact, as is sometimes stated, that such counterbalances only develop vicious tendencies at high speeds, because the steam compression serves at high speeds to check the momentum of the piston, and that, therefore, counterbalance is not needed there; for it is the action of the counterbalance at right angles to the piston motion, namely, vertically, that is so mischievous when steam compression cannot act and is not existent. It is simply that at high speeds the centrifugal action as measured by the expression $C = .00034 WRN^2$ becomes excessive. The reason that more is heard of this action in America than in England is simply that though railway speeds are higher in England the wheel revolutions are not greater per unit of time, as the American practice of using small wheels brings up the factor N^2 to a serious figure, a 60-in. wheel at 50 miles per hour having a much higher rate of revolution than an 80-in. wheel at 60 miles velocity.

The demand for higher speeds seems to call for some different arrangement of the machinery of a locomotive than has hitherto been attempted, in order that a balance may be effected in every direction on the horizontal plane without the fatal introduction of the vertical balance-weight action so prejudicial to bridges and rails.

When a machine is balanced we understand that its centre of gravity is stationary. In a locomotive the centre of gravity is not stationary, because the various moving parts cause it to change continually. We endeavor to remedy this by arranging that for every pound weight moving in one direction there shall be another pound weight moving an equal distance in the opposite direction in the same plane, or there shall be such a combination of moving weights in different planes that no movement of the centre of gravity of the machine on a whole takes place.

When we have done this in a locomotive, we find that by using revolving weights to counteract the pistons we have caused the centre of gravity to rise and fall, but this has made no difference to the engine, because its upward action has not been enough to lift the engine off the rails nor to push the wheels through the rails. Doubtless a few wheels have pushed down a bridge or two and caused trouble in floor beams and hangers, but the cause has been laid to weakness under static loads and to repeated loadings, or anything but the right thing. Now we clearly recognize that excess of vertical action has been the cause of much past trouble and many broken rails, as well as of much slipping of wheels, and it has got to be abolished.

The moving parts of an engine are not heavy as compared with the total weight of the engine and tender. Supposing that a piston and its horizontally moving appendages weigh, let us say, 300 lbs., and the engine and tender weigh 180,000 lbs., the ratio is $\frac{1}{600}$. The piston moves 24 in., and $\frac{1}{600}$ of this is only $\frac{1}{25}$ of an inch. The to-and-fro motion of the piston has, therefore, power to change the C. G. of the weight in front of the draw bar only $\frac{1}{25}$ of an in., and the vibration of this (for the locomotive would travel, with a wheel of 18 ft. circumference, as much as 9 ft. 0 $\frac{1}{2}$ in. during one-half of a wheel revolution, and only 8 ft. 11 $\frac{1}{2}$ in. during the other half) would be absorbed in the draw-springs entirely.

At a high speed, however, the moving parts require much bringing to rest, for they start and stop perhaps ten times every second. Now, whether brought to rest by steam compression or by the corresponding reaction of a counterbalance is very different. If by a counterbalance, the whole machine remains unaffected, for the movement of the piston, which tends to twist the locomotive round on a vertical axis and place it end for end, is exactly balanced by the equal and opposite action of the balance; but when steam is used the stored energy of the piston is transferred through the cylinder cover to the engine frame, and the whole machine is twisted so as to bring the wheel flanges at opposite ends of the engine against opposite rails; in fact, the tendency is again to reverse the engine end for end. Fortunately, the alternations of twist are so rapid that not a wheel has time to reply by mounting the rails, though vibration is set up, which is by no means pleasant. Hence, in present constructions, balancing of pistons, etc., is necessary, and it behooves us to inquire into a method of different construction, whereby we can avoid the vertical counterweight acting so injurious to bridges, and yet produce an engine free from twisting moments.

Let us suppose an engine to be constructed wherein the cylinders were each coupled to wrist-pins without the customary angle of 90 degrees between them. Each piston would move simultaneously with the other. In such an engine it is easy to perceive that at no speed could there be set up a couple tending to twist the engine. Each piston would in that respect exactly balance its fellow. No counterweights would be needed. Being without counterweights, the action of two pistons moving simultaneously in the same direction would alter the C. G. twice $\frac{1}{25}$ of an in. in our given weights. This would not be felt in the train.

The momentum of the pistons could be counteracted by steam or compression without dangerous results or twisting

action, for the same action occurring on each side of an engine would be inert in this respect. Such an engine balanced for rotating parts would need no further balance for pistons, and there would be no dangerous bridge stresses as now caused.

As regards uniformity of rotating power claimed for cranks at right angles, it is well known that stationary single engines with moderate fly-wheels give all the uniformity desired; and in this respect it cannot for one moment be held that a 70 to 100-ton engine and tender have not all the fly-wheel action in themselves to run with perfect steadiness without the need of the old-fashioned idea of right-angled cranks.

But we must not overlook the fact that, beyond the supposed utility of cranks at 90 degrees, they have a real use as a means of enabling the engine to start at whatever position it may stop in. One cylinder will be in such gear that with all usual cut-offs of steam the locomotive will move back or forwards, but with simultaneous pistons it is likely that there will be frequent stops with cranks on the dead point; and yet all our trouble from balancing arises from these opposite side pistons being connected at 90 degrees. Knowing this, we may now cast about for a means of employing the simultaneous pistons without their one enormous disadvantage; for even supposing that it would pay to keep a spare engine at every station to help a starting train, it would be a trifle awkward for the fireman to use a pinch bar under the engine wheel when stopped by signal on a journey.

In the first place, as it is in high speeds that the improved system of balancing is most needed, we may first confine our attentions to such, and inquire what is most suitable. Modern practice is clearly not averse to a multiplication of cylinders, as evidenced by the growing use of compound locomotives. Here then we see how simultaneous piston action may be secured. We may build an engine like Webb's compound with three cylinders, two of which are outside and with simultaneously moving pistons and one inside, and exactly central, and therefore having no twisting movement, but connected at right angles to the same axle as the outside cylinders. Such a locomotive may be either a three-cylinder simple engine, with boiler steam in all cylinders, or a compound engine capable of having boiler steam in all cylinders when starting. With three equal-sized cylinders, the two outer ones being the low pressure, such a locomotive would always have a starting power equal to that of the present type of locomotive. As a coupled engine to utilize the adhesion of two pairs of wheels, it would require coupling rods, and in this respect would sacrifice the supposed advantage of the Webb engine, which dispenses with these rods.

Similarly we might construct our engine with four cylinders, all on one axle, and with the two inside cranks simultaneous and at 90 degrees from the outside.

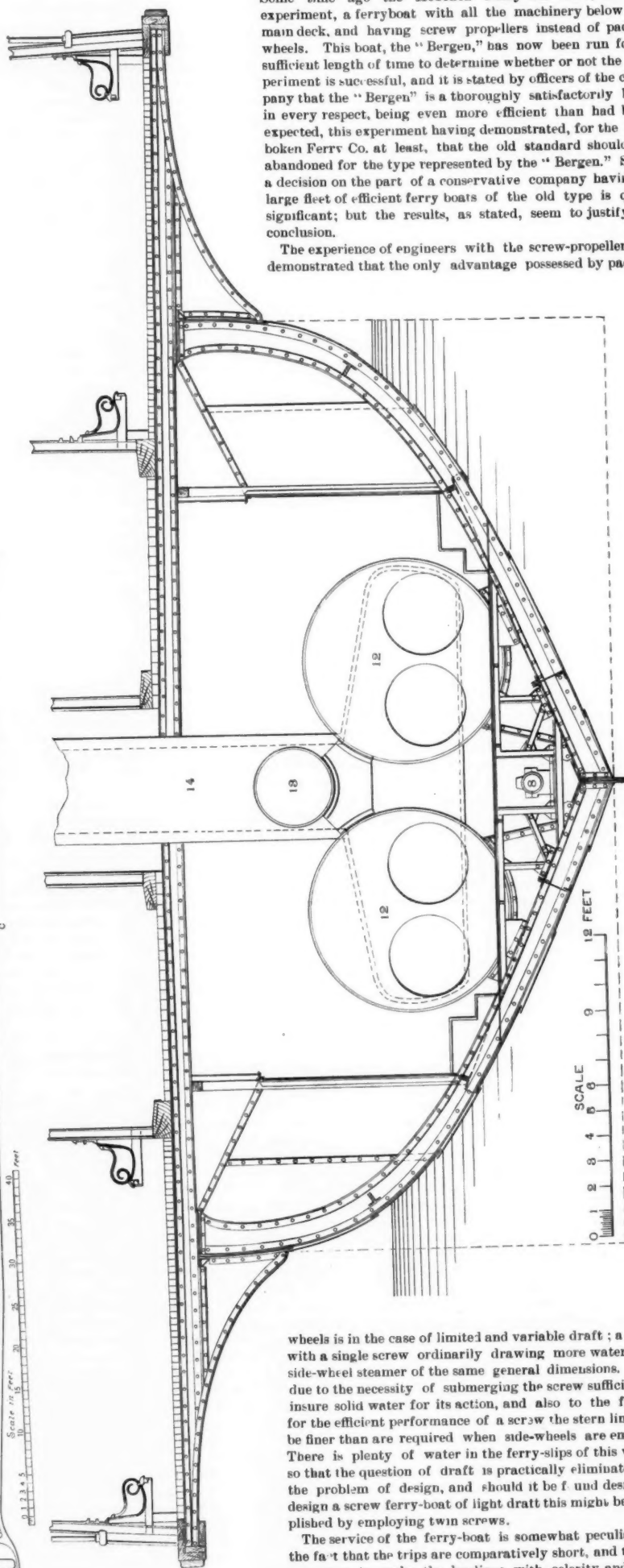
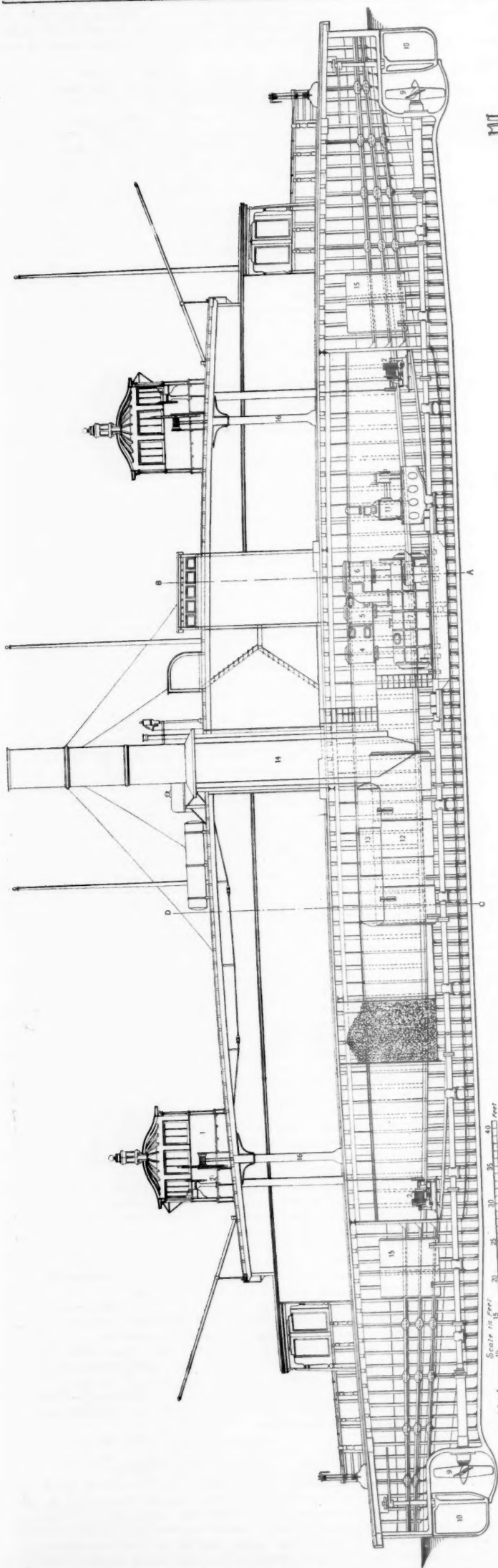
This also might be a compound engine, but the inside cylinders would then be small to act as the high pressure pair. Here again we should require coupling rods. Now, where more than two cylinders are used it seems a desirable thing that each pair of driving wheels should receive some of the turning power without using coupling rods, and there is no reason why this should not be done. A method for starting must be employed which can be used for any engine, however constructed, and we hold that a proper balance can only be effected where pistons, not in the centre line of the engine, are opposed by pistons running simultaneously at an equal distance from the centre line. How then must the starting difficulty be overcome? Very simply. In textile factories it is not allowed to be a hindrance for a moment even with simple engines or with side by side compounds when the high-pressure crank is at the dead point. Stationary engineers are more progressive, for they use a small, quick running engine geared through a worm and of sufficient power to turn the wheel of the big engine until the crank is at a position to start when the little engine drops out of gear automatically. Now there is no possible reason why a similar plan should not be equally applicable to a locomotive. To turn the crank off its centre to a position of leverage would not require any amount of time, and the start when steam took hold of two pistons would be powerful and efficient and take the engine over the next dead point without any further assistance from the starting auxiliary.

Especially would such an arrangement be suitable for express long-distance trains making few stops and running at high speeds, demanding that the present vertical action of the wheels be abolished.

Though doubtless the abolition of right-angled cranks may seem a bold measure, it is not so in reality, and only waits trial to be a success, as it has proved itself to be in stationary work. Every locomotive man knows that with a disabled engine and running with one cylinder there is no trouble in getting along with a train that is within the power of one cylinder, and that when under way there is no danger of striking on the dead point. Indeed, the question admits of no argument other than that of the power to start, and this may safely be left to the auxiliary starting engine, which is quite as easy of attachment as a Westinghouse air pump or a small engine driving a dynamo. Indeed, there appears nothing against it.

The Ferryboat "Bergen."

In the case of an established ferry, the size of slips limits the allowable beam of the boats, and the number of slips limits the number of boats, and consequently the number of trips which can be made in a given time. Hence, if traffic increases, some means must be provided for rendering the boats more efficient in carrying capacity without increasing the size. The standard ferryboat in New York harbor, if



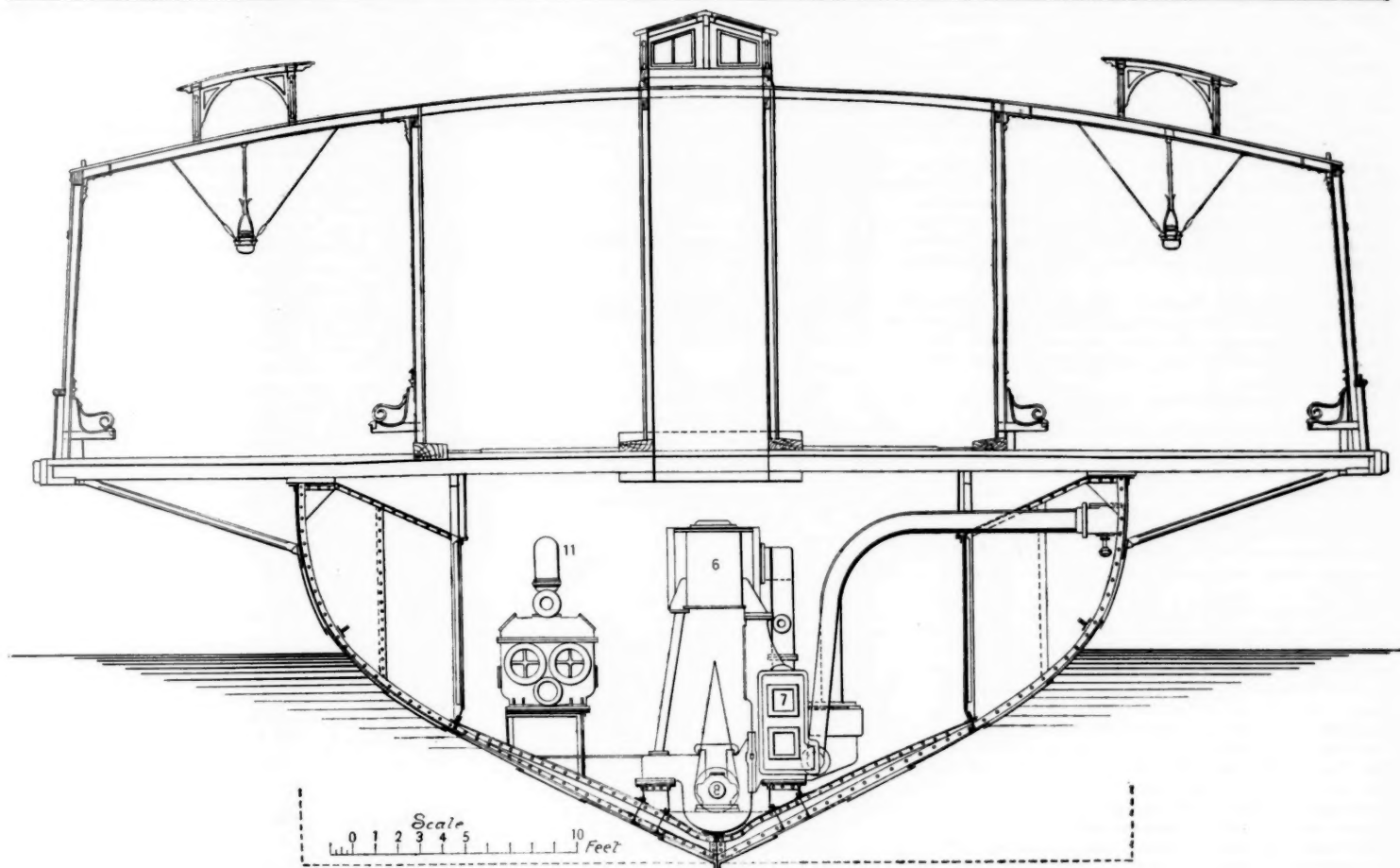
STEEL SCREW FERRY BOAT "BERGEN," HOBOKEN FERRY COMPANY.

extended practice establishes a standard, is the well-known side-wheel steamer with a beam engine, whose engine-house occupies a space which might be utilized for vehicles and horses, and whose wheel-houses divide each cabin into two compartments connected by a narrow passage. Some time ago the Hoboken Ferry Co. built, as an experiment, a ferryboat with all the machinery below the main deck, and having screw propellers instead of paddle wheels. This boat, the "Bergen," has now been run for a sufficient length of time to determine whether or not the experiment is successful, and it is stated by officers of the company that the "Bergen" is a thoroughly satisfactory boat in every respect, being even more efficient than had been expected, this experiment having demonstrated, for the Hoboken Ferry Co. at least, that the old standard should be abandoned for the type represented by the "Bergen." Such a decision on the part of a conservative company having a large fleet of efficient ferry boats of the old type is quite significant; but the results, as stated, seem to justify the conclusion.

The experience of engineers with the screw-propeller has demonstrated that the only advantage possessed by paddle-

wheels is in the case of limited and variable draft; a steamer with a single screw ordinarily drawing more water than a side-wheel steamer of the same general dimensions. This is due to the necessity of submerging the screw sufficiently to insure solid water for its action, and also to the fact that for the efficient performance of a screw the stern lines must be finer than are required when side-wheels are employed. There is plenty of water in the ferry-slips of this vicinity, so that the question of draft is practically eliminated from the problem of design, and should it be found desirable to design a screw ferry-boat of light draft this might be accomplished by employing twin screws.

The service of the ferry-boat is somewhat peculiar, from the fact that the trips are comparatively short, and that it is necessary to make the landings with celerity and safety, these requirements calling for a steamer which answers the helm quickly and can reverse its motion promptly. Many advocates of the established order of things were convinced, in advance of the experiment, that a screw ferry-boat would be a failure, because it could not be made to steer well nor made to back promptly; but as often happens in the case of such *a priori* reasoning, the results have established the con-



STEEL SCREW FERRY BOAT "BERGEN."

trary; and it is stated that the "Bergen" leaves nothing to be desired in these respects—steering readily and going astern in less time than a side-wheel boat takes.

The "Bergen" is a steel vessel, 200 ft. between perpendiculars, 203 ft. over all. The moulded beam is 37 ft., and the width over guards, 62 ft. The depth of hold is 17 ft., and the draft is 10 ft., except at the ends, where the steel shoes, which form supports for the rudders, increase the draft 6 in. The design of the hull is made with a view to rendering the boat very strong and stiff, and practically unsinkable in case of collision. The general details of construction are shown in the accompanying sketches. The cross-section on page 521 is through the engines, on line A B, and that on page 520 is through the boilers, on line C D. The steel used in construction has a tensile strength of about 48,000 lbs. sq. in., or about 12 per cent. more than that of iron employed for ship-building. The keelson or keel is a plate $\frac{3}{4}$ in. thick, 22 in. deep, running the whole length of the hull, and riveted at each end to steel bow-pieces. There are floors on either side of keel with angle pieces, $4 \times 3 \times \frac{3}{8}$ in., and reverse-bars on every plate, $3 \times 3 \times \frac{3}{8}$ in. The longitudinal floor plates are $\frac{3}{8}$ in. thick and 14 in. wide, riveted to every frame. From every fifth frame, belts of $\frac{3}{8}$ in. plate, 14 in. wide, run from keel to gunwale; and there are 3 keelsons on each side of the keel. The keelson and springer angle plates are $5 \times 8 \times \frac{3}{8}$ in., set back to back, with intercostals. The steel sheathing has the following thickness: garboard strake and two strakes at water line, $\frac{3}{8}$ in.; plates at end, from water line down, $\frac{1}{2}$ in.; balance of plates, $\frac{3}{8}$ in. The hull is divided into 13 water-tight compartments, by two athwartship bulkheads, about 36 ft. from either end; two longitudinal bulkheads, riveted to athwartship bulkheads and to skin of vessel, 3 ft. below water line, running up to within 30 in. of the deck; and athwartship bulkheads, from the longitudinal bulkheads to skin of vessel, forming 5 compartments on each side, between longitudinal bulkheads and skin. The bulkheads are composed of $\frac{1}{2}$ in. steel plate, braced by angle plates, $3 \times 3 \times \frac{3}{8}$ in. at intervals of about 2 ft. The compartments are so arranged that there is little probability of more than one of them being opened in case of collision; while any three of them can be flooded, and the vessel will still float.

The water lines of the "Bergen" are very fine at the ends, so as to secure efficient action of the screws; and the lines above the water line are made very full, so that the trim of the vessel will not easily be changed by shifting loads.

The steam machinery consists of a triple expansion engine coupled to the line shaft, which runs the whole length of the vessel, having a screw propeller at each end, so that both screws are operated when the engine is motion; and two cylindrical tubular boilers. The hull and boilers of the "Bergen" were designed by the Hoboken Ferry Co., but the engine was built from patterns made for another steamer. The general arrangement of the machinery is shown in the figures; the two boilers, 12, each with a diameter of $8\frac{1}{2}$ ft. and 26 ft. long, having two cylindrical furnaces, with Adamson joints, diameter of furnaces, 34 in. length, 7 ft. There is a brick bridge wall in each furnace, and combustion

chamber beyond, whence the products of combustion pass into the tubes, which have a diameter of $3\frac{1}{2}$ in. There is a common steam drum, 13, for the two boilers. The smoke-stack, 14, which connects with the two uptakes, is oblong in section 62×42 in., and has a height of about 48 ft. above the grates. The steam from the boilers passes through a Curtis separator, thence through a piston valve into the high-pressure cylinder, 4, exhausts from this cylinder, through a piston and a slide valve into the intermediate cylinder, 5, thence through a slide valve into the low-pressure cylinder, 6, after which it goes through an oil separator into the surface condenser, 7. The air pump is actuated by a beam connected to the low-pressure cross-head, and a duplex steam pump, 11, acts as a circulating pump. The framing of the engines is shown in fig. 2. The cylinders overhang a casting, of which the condenser forms a part, and are supported by inclined columns. The cross-head pins overhang the bearing surfaces of the cross-head. This arrangement seems peculiar for an engine which is required to work in either direction with equal efficiency; and the combination of slide and piston valves is also rather unusual for a case of this kind, where there is plenty of room available. The engine is very compact, and seems to have been designed for a limited space.

The cranks are set at angles of 120° , and the crank shaft is coupled rigidly to the line shafts, $8\frac{3}{8}$ in. in diameter, which have a thrust bearing on each side of the engine, and sixteen rigid bearings throughout their lengths. Such an arrangement of line shafting in a vessel, without spring bearings or flexible couplings, is quite unusual, and that it can be operated successfully speaks well for the rigidity of the hull. But it is doubtful whether this rigid connection is economical, because it is quite probable that considerable power is wasted in overcoming friction, on account of defects of alignment which are well-nigh inevitable in cases of this kind.

The "Bergen" has two steering engines, 2, and there is also a hand steering gear, 3, in each pilot house, 1. The rudders, 10, are of the balanced type, and have such a form that when pinned in a straight position they conform to the lines of the hull. The screw propellers, 9, are of cast steel, four-bladed, 8 ft. in diameter, $9\frac{1}{2}$ ft. pitch. There are two water tanks, 15, for furnishing fresh water to the boilers when the supply from the hot well is insufficient.

There are two duplex steam pumps for feeding the boilers, and injectors are also fitted. A ventilating blower is arranged so as to deliver heated air into the cabin in winter and cool air in summer. The vessel is lighted by gas, the Pintsch system being employed. The valves of the engine are operated by the Stephenson link motion, fitted with a steam reversing gear; and it is stated that the engine can be stopped and backed promptly without admitting live steam into any but the high-pressure cylinder.

The main deck of the "Bergen," between the cabins, is all clear, except for a short house forming the engine-room hatch and inclosing the smoke-stack; and two columns, 16, which support the hurricane deck. The cabins are unbroken from end to end, furnishing considerably more seating capacity than is possible in the case of a side-wheel boat of the

same dimensions, and affording free passages for ingress and egress. The effect of dispensing with the wheel and engine-houses is to furnish about 30 per cent. more carrying capacity.

The average steam pressure carried in the boilers is 140 lbs. per sq. in., and the engine makes about 140 revolutions a minute. On a trial trip of the "Bergen," running over a measured mile, the steam pressure was 140 lbs. per sq. in., the revolutions $168\frac{3}{4}$ a minute, the indicated horse-power 1,042, and the speed attained was at the rate of $14\frac{1}{8}$ miles an hour. This corresponds to a slip of about 18.9 per cent. The action of the screws in this vessel is said to give a very steady motion, free from the vibration incident to the operation of side-wheel ferryboats.

The company is not prepared to furnish figures showing the relative economy of the "Bergen," as compared with boats of the old type, for the reason that some changes are being made in the engine which are expected to produce more economical action.

The drawings and dimensions contained in this article were kindly furnished by Mr. C. W. Woolsey, Superintendent of the Hoboken Ferry Company.

Improvements on the New York Central.

In addition to the buildings and other improvements briefly mentioned in our news columns last week, the New York Central & Hudson River road is making, at its new terminal grounds, above One Hundred and Fortieth street, New York City, various other improvements, of which we give some details below:

There is a machine shop 115×80 ft., smith shop 50×80 ft., carpenter shop 75×40 ft., "wheel-drop" house 40×25 ft., and a complete set of buildings and plant for manufacturing and supplying the Pintsch compressed gas to passenger cars. The half-circle 22 stall engine-house, at the "Y," is of brick, 310 ft. exterior diameter, the house being $67\frac{1}{2}$ ft. in width, with a turn-table 67 ft. long. A small machine shop and store room, 90×20 ft., is also annexed to this engine house. The entire building will be heated by steam coils. Provision is also made in the plan of this yard for another engine-house, a duplicate of the one just described. There will also be erected at this engine-house during the present season a coaling trestle of 12 pockets, six on each side, with 2 ash pits 100 ft. each in length.

There is also nearly ready for use a very complete plant for the special accommodation of all the Wagner Palace Car Co.'s cars, consisting of a brick building 210×42 ft., in which will be located all that company's store rooms, commissary department, offices, accommodations for employes, and shops for minor repairs of upholstery and cabinet work, etc. Covered platforms are also provided for eight separate trains, and furnished with hot and cold water for car washing. One of these is 760 ft. in length, five of 715 ft., one of 500 ft., and one of 480 ft. After this plan goes into operation, all the cars of the Wagner Company will, after discharging their passengers at the Grand Central Depot, be sent to this point for cleaning, ventilating, stocking or making such repairs as may be necessary at this end of the line.

There is also nearly completed in this yard a small local freight house, 60 x 40 ft., near the corner of 158th street and Morris avenue, intended for the local accommodation of the region around Mott Haven and Melrose. The entire system of switches at the junction "Y" will be interlocked. The "Saxby & Farmer" and "Toucey & Buchanan" machines will probably be employed, but the permanent interlocking system will have to be deferred until all the new tracks and connections are made. The existing arrangements are only temporary, and are changed from time to time as made necessary by the progress of the work of constructing the depressed roadway and incident to changing of the tracks.

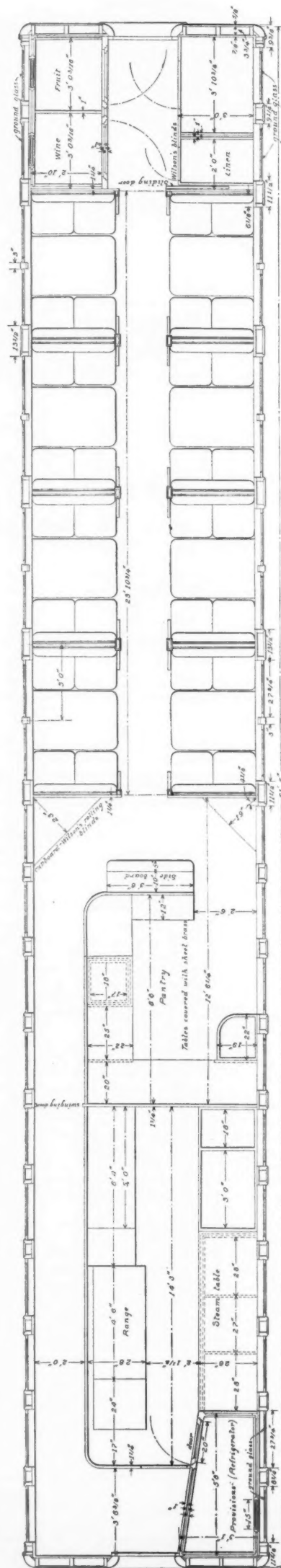
In all the work in connection with the four tracking, the integrity of the block system and of distant switch signals has been scrupulously maintained, every switch, however temporary its existence, being provided with a regular distant semaphore.

Pennsylvania Dining Car.

We show herewith a sketch of the floor plan of dining car No. 705, which is now in service on the Congressional limited express of the Pennsylvania, between New York and Washington. This car has just been completed at Altoona, and embodies the results of careful study of all the points essential in such a car and of the experience gained in operating dining cars on heavy trains. The external appearance of the car is that of an ordinary coach, the color being the Pennsylvania standard and the lettering modest. The car has no name. The interior arrangements are very complete and the platforms and passageways are entirely free from encumbrances. Wilson's rolling blinds are used for two of the doors, which, if hung in the usual way, would obstruct the passage ways when open. The sideboard is in the usual position, between the pantry and the dining room, but it is not so large as in some cars. The linen lockers and the cold air chests for fruit and for wines are in the end of the car opposite from that containing the kitchen and the pantry, but the position of the conductor when meals are being served is in the usual place, between the pantry and the dining room. There are eight tables, seating four persons each, and the backs of the seats rise to about a level with the heads of the persons sitting at the table, thus making a substantial partition. The entire equipment of the car is new, and the glass, china and silver is of exquisite design. Much of it was made on special orders, and the decorations are of the highest class. The tables, sinks and refrigerators of the pantry are covered with sheet brass, enabling them to be easily kept clean. The kitchen is fitted up with a fine Bramhall & Deane French range and a steam-heated carving table and warming oven. A large refrigerator room opens into the kitchen, in which meats and other provisions can be hung up and readily obtained. As the kitchen is completely lined on floor, sides and ends with zinc and galvanized iron and has also corrugated iron ceiling, it can be very readily cleaned out with a hose and kept entirely free from vermin.

The car has double windows, and special care has been taken with the ventilation. The sashes in the clear-story of the dining room are all fixed except those at the ends on each side. To these are attached funnels by which, when the car is in motion, air is exhausted through the netting which covers the opening. There are also in use in the car a number of window-sill ventilators which seem calculated to be effective in excluding dust. These ventilators consist of a fine brass netting fixed in a wooden frame, which fits tightly between the window-sills and the bottom of the sash, which is raised about 3 in. The air in entering is obliged to flow upward and the resistance of the fine netting is overcome by a funnel-shaped mouthpiece on the outside. An adjustable slide in the opening in the frame enables the passenger to regulate the admission of air whenever the current becomes too strong. This ventilator was devised with a view to affording means of ventilation which shall be at the command of individual passengers on sleeping cars. Any one who has enjoyed a night on the average sleeper, when, on account of the hot weather outside or by reason of the feverish state of the brain of the colored porter inside his berth was intolerable and could be ventilated only by the admission of a compound consisting of 50 per cent. air and 50 per cent. cinders, would appreciate this invention.

But the excellent arrangements of the rooms, economy of space and provision of the completest refrigerating apparatus, do not constitute the distinctive feature of the car. The artistic effect of the interior of the main room is unique, and the woodwork and decorations require special mention. The style chosen is the Renaissance of the plainest period. The dining apartment is finished by the "Dawsonamel" process in a beautiful shade of ivory color, with the carved moldings and parts lightly tipped with gold. The metal trimmings are all gilt and of classic design. The ceiling is covered with a rich figured silk, with gilt centre piece and corners. The silk is old rose, and the embroidery is in delicate lines of white, giving the silk the appearance of being overlaid with lace. The curtains are of heavy moiré silk, the color harmonizing with that of the ceiling and of the plush upholstery. The whole treatment of this room being in analogous colors, the beautiful warm tones of old rose and gold make the harmony perfect, and the first impression on entering is that of a parlor in a stately mansion rather than of a vehicle to be "hustled" over the country at break-neck speed. The car is brightly lighted by the Frost dry carburettor system, which still further adds to the rich effect of the interior. The vestibule, hall and pantry are finished in cherry, in the same style as the dining room, except that it appears in the natural color, instead of ivory and gold.



Shop Notes in London.

The American engineers visiting shops in London found many items of interest. It was almost impossible to make written notes; in most cases it was not permitted, yet several of the visitors felt that they had obtained information of value for future use in American workshops. The visitors were pleased to find that not a few of the tools in use were of American manufacture or design, and that their English hosts were free to admit their preference for certain American tools.

At the shops of Maudsley's Sons & Field, marine and mechanical engineering works, Westminster Bridge Road, London, the visitors found Mr. William Charles Clifford Smith, Assistant Manager of the works, ready to receive and entertain them in a most hearty manner. At these shops are building several varieties of marine engines of various sizes, one of which, for the Brazilian government, is an enormous horizontal compound engine of an old type, but it is in exact accordance with the specifications of that government. Probably the most interesting marine engines here shown were those for a high-speed torpedo boat. These engines are to generate 1,500 horse-power at a speed of 650 revolutions per minute. This enormous speed made the engines an object of particular interest, and it was difficult to realize that such large masses of metal could be moved at such a velocity. However, such was the case, and further inspection revealed the care taken to accomplish this end by a reduction of the weight of all parts to a minimum. The shafts were hollow, and also the crank pins, each being forged upon a mandril. The shaft remains as it came from the forge; but the crank pins are drilled out. The shaft is about 8½ in. in diameter. This shaft, traveling at 650 revolutions and without heating, was rather a marvel to those engineers who had been experiencing difficulty with smaller engine shafts moving at only about 300 revolutions per minute. Another party of engineers which visited Messrs. Yarrows shipbuilding and torpedo yard at the Isle of Dogs had the pleasure of seeing engines of this class running during an excursion on a torpedo boat, and were somewhat astonished at the perfection of balance and steadiness of motion of both boat and driving machinery. The pistons of these engines are made of cast steel in the form of conical disks without ribs. The engines being triple expansion, there are three pistons of different diameters. These pistons are made with the same camber in the disks; this allows the cylinder faces to be in line, and permits the use of the same length of piston and connecting rods. The care taken in the construction of marine engines is well illustrated here. Each and every joint and bearing is well made and fitted.

The use of the forged steel cylinder lining in the stern cylinder is an item of interest. These linings are furnished ready for use by the Sheffield manufacturers, and are made to any desired dimension. The process of manufacture is kept as secret as possible by the firm manufacturing them. It is understood, however, that they are made on a mandril first and then rolled to nearly the desired dimensions, after which they are finished all over and made ready for use. These linings are made to dimensions exceeding 100 in. in diameter, 1 to 1½ in. in thickness, and 5 ft. in length without a flaw, as far as can be observed. They are pushed into the cylinder shell by a low hydraulic pressure, and bolted firmly to one end, the other end being attached to an expanding copper joint. This lining forms the inner side of the steam jacket, the cylinder shell forming the outer side. The slide valves on the marine engines built at these shops are balanced principally by the use of circular packing rings on the back of the valves in a manner similar to that used not long since for locomotive slide valves in the eastern states. In the cylinder-fitting department there is a large upright plane, or shaper, which has a capacity for the largest class of marine work. The cylinders and uprights are placed on a stationary table, across which, in both directions, vertically and horizontally, travels a huge cross head with several cutters. This tool is termed a "wall creeper" in this shop; probably because it is placed against the wall of the building and travels up, down and along its face. The use of the band metal saw is well illustrated here by one of large dimensions, which is used to cut out the jaws of large eccentric rods from a solid block and to cut off the stubs of crank pins after they have been turned. The speed of the saw is a little faster than that of a circular mill on the surface, and its temper is about the same as that of the average milling cutter for the same work. The blade is fed with soda water as usual for cutting tools. In order to give the table a larger capacity the throat of the machine is made deeper than usual and the saw blade is carried back away from the work by a third or "idle wheel" at the back of the machine. Many parts are sawed on this machine without the use of clamps. Thus a workman saws off the sprues from steel castings, the ends from bolts, or cuts off iron at a desired length, without the assistance of clamps or vise. In fact the tool is used in much the same way as the common band saw is used for wood. One of the most rapid tools used in this shop is one for boring the tube sheets of condensers; a drill of special shape bores rapidly through hard brass at a rate nearly equal to that of a punch.

The location of the foundry in this shop is peculiar to itself; it is upon the second floor of the shop. The heavier castings are dropped from the bottom of their molds to the floor below. This arrangement was not the result of an unprejudiced choice. The nature of the soil and the proximity of tide water prevented the casting of large pieces on the earth at the ground floor, therefore it was found necessary to use the second floor, and not a few incidental advantages have resulted therefrom. This company manufacture

many air compressors for the torpedo boats of Her Majesty's navy and other apparatus connected therewith. Not a few curiosities are to be found in these works, among which is one of the oldest lathes of metal for metal work, made almost entirely by hand, also several large tools whose flat and true surfaces were made by a strong arm wielding a hammer, chisel and file. Also, a pair of old compound engines built in 1824 are still running a portion of the shop. These engines have wheel crossheads running on bar guides, are of the vertical type, and contrast strongly with those large engines now being built with tools which are driven by these "old timers." The "model room" at the entrance to these works contains many beautiful models, which are constructed of metal and show the advances and changes made in marine engine practice in recent years with such vividness as to leave an impression not to be obtained from mere drawings.

One class of machine building here is of great interest to electricians. It is a large dynamo about 14 ft. in diameter made with a cast-iron frame and wrought-iron pole pieces, 96 in number, on the Ferranti system of producing an alternating current for incandescent lighting. Only the main structure of the machine is made here. Four machines are now being made. They are built upon a well-known principle, but dynamos of such large dimensions have never before been tried and electricians are looking forward with much interest to the completion and trials of these vast "Moguls." They are constructed with considerable difficulty owing to the large dimensions and the peculiar designs. The wrought-iron poles are placed in the mold in the foundry and the cast iron is poured around them, the resulting casting looking not unlike a large water wheel in which the wrought-iron pole pieces form the blades and the dynamo disks the sides of the wheel. After casting, the disks are placed in an immense mill which cuts the wrought-iron pole pieces in two parts at the centre, thus separating the disks. When these disks are mounted upon the beds prepared for them they are separated a short distance to allow the thin armature disks to run between them.

The Locomotive Engineers and the Conemaugh Flood.

There have been so many conflicting stories concerning the heroic conduct of certain engineers of Pennsylvania Railroad trains in giving warning of the impending danger to people along the line on May 31, that we have secured the following authentic account from an officer of the road. It will be found of interest even at this date. Our correspondent says:

The agent at South Fork, who was keeping himself posted by every possible means of the situation at the dam, located two miles south of him, telegraphed to Mineral Point, thence by messenger to Conemaugh—the railroad wires being already disabled—that the water was then running over the breast of the dam, and that it was becoming dangerous. This message was delivered at Conemaugh about 2 p. m. All wires west of Conemaugh were gone. Engine 648, a west-bound freight train, Engineer H. M. Clifford, then started west from Conemaugh, arriving at Johnstown about 2.30 p. m., which was one hour and 30 minutes before the waters from the dam reached there. Clifford, as well as his conductor, warned people in houses near the railroad of the situation and to get to high ground. Some heeded the warning, others paid but little attention. This train left Johnstown at 3 p. m., stopping at Cambria, a suburb of Johnstown, where the same warning was given and then continued to Nineveh, where they had some little work to do. They next reached Lacolle, 16 miles west of Johnstown, where trackmen stopped them, as the line was not considered safe to advance. They then went back to New Florence, two miles east of Lacolle, where they were once more in communication with the superintendent's office at Pittsburgh, and received orders to run through the middle siding, that track being considered comparatively safe; from there to Lockport, however, the track was in very dangerous shape, the bank being badly washed and the water being up to within a foot of the rails. People were warned here the same as at other points, and the train continued to Bolivar, 19½ miles west of Johnstown, where they had some work to do. They arrived at Bolivar about 6 p. m. and moved from there to Derry, arriving at that point about 7.30 p. m., the end of their run, without any unusual occurrence.

From this you will note that Clifford had no information that the dam was broken; but with official advice that water was running over the breast of the dam, he was certainly safe in assuming that the dam might possibly break within a short time. While in making this trip he placed himself in no immediate danger, his prompt action and great exertions to notify everybody is worthy of note.*

In regard to the other published incident in which Clifford figured to so much advantage, the facts are as follows: On the night of Aug. 10, 1880, he was firing an engine pulling a freight train out of Gallitzin (which is the summit of the mountain) for Altoona. The summit at this point is located in the tunnel and the train parted, 12 cars remaining attached to the engine. These cars continued eastward as the engineman, on account of the tunnel, was unaware of the break. The operator at the west end of the tunnel, however, noticed the trouble and dropped the red signal, the intention being to stop the rear portion of the broken train by means of the pusher engine attached to the rear end. But this engineman shut off too suddenly and caused 19 cars more to become detached from the front part of the broken train, and they ran on

The wires being down, this notice given from the freight train was apparently the only direct and reliable warning given after two o'clock.—EDITOR.

through the tunnel. The engineman of the front portion was signalled by the block signal tower at the east end of the tunnel and was notified that his train was broken in three pieces, and that there were 19 cars (the middle portion) still in the tunnel. The engineman, fearing a collision, kept his front portion moving away from the middle piece, and in the vicinity of Bennington furnace, about 1½ miles from the summit, the middle portion overtook the front part, striking it several times. Fireman Clifford in the meantime was getting his white light in order to go back to apply the brakes of the cars attached to his engine, and from the top of the cars noticed his engineman jump from the engine at Bennington, the crew having already jumped from the train. Clifford then came forward to his engine, reversed it and kept it reversed, using steam and sand until he had both pieces under control; and he succeeded in getting them stopped near Allegripus, which is three miles from the summit. The engineman was promptly discharged and fireman Clifford at once promoted to that position.

In connection with this announcement of the approach of the flood, many persons have gotten the action of Engineman Clifford, in running from Conemaugh to Derry, confused with that of engineman J. C. Hess, who had charge of engine 1124, an extra work train, which was lying about one-quarter mile east of Conemaugh when the flood approached. The laborers and others connected with the train were working at a slide some distance east of where this engine and train were standing. Hess was on his engine when he heard the tremendous roar of the approaching water, and correctly concluded that the waters of the broken dam were coming. He instantly started with his train for Conemaugh, blowing the whistle all the way. When he started the water was about 300 yards behind him, and on reaching Conemaugh he estimates that the flood was then within 150 yards. At Conemaugh, it will be remembered, there were standing three passenger trains with passengers, and this whistle of engineman Hess was the first warning to these passengers, as well as to the people in Conemaugh, that the waters of the bursted dam were actually near by. Of course, announcements had personally been made within an hour before this time that the water was running over the dam, and they might be expected at a moment's warning to take to the hills, but it was not expected that the flood would come so suddenly and with such force. Immediately on the first sounding of his whistle the attention of everybody was attracted, and the passengers and others started for high ground and, no doubt, many lives were saved which would otherwise have been lost. He, himself, with his crew, after reaching Conemaugh, barely succeeded in getting to the hill in advance of the flood, which swept his engine and train into the common wreck made by cars, locomotives, round house and dwellings.

The Transportation Problem Connected with Great Exhibitions.

Mr. Edward P. North in a communication to the *Engineering & Building Record*, concerning the best site for the proposed World's Fair of 1892, gives the statistics shown below together with some interesting reminiscences of the Philadelphia Exhibition of 1876. He says:

"A location by the sea has been advocated, for its supposed reduction of the freight charges for installation; but as freight cars will be found the most handy and economical instruments for distributing freight in the grounds, considering the great weight and size of many of the packages, the distance of the exhibition from tide-water will be only a question of an additional mile or two of haulage. Many miles of standard gauge track were laid through the grounds at Philadelphia for convenience of building and installation, and between three and four miles were maintained throughout the Exhibition, for convenient service, transporting coal, ice, etc., in addition to 5½ miles of narrow gauge railroad devoted to passenger service. Various adverse influences discouraged visitors at Philadelphia during the first three months, and until about September the railroads of the country refused to make the low rates of fare necessary for the encouragement of excursion travel.

The effect of the combined discouragements may be judged from the fact that in May, June, July and August the average daily attendance was only 38,076, while for September it was nearly 82,000, for October, 102,460, and, in spite of the bitter cold of the first of November, the average of the nine days the Exhibition was open reached 115,316. This large attendance was in spite of wretchedly insufficient provisions for rapid transportation, though by a system of exchange tickets nine-tenths of the inhabitants of Philadelphia and their guests could visit the Exhibition at an expense of 18 cents for the round trip, and a walk of not over a quarter of a mile. But the horse cars were very slow, and were overcrowded in June and July. The estimated capacity of the various lines leading to the Exhibition was:

	Hourly.	Up to 3 p. m.
By 2 railroads.....	6,250	50,000
By 6 horse railroads.....	12,180	97,440
By steamboat on the Schuylkill.....	2,500	20,000
By carriages.....	1,000	8,000
	21,930	175,440

The great number of people reached the Exhibition between 7 a. m. and 3 p. m.: 89 per cent. gaining admittance before 1 p. m. With this theoretical capacity, there was great delay and annoyance in returning to Philadelphia as soon as the attendance exceeded 40,000 per day, and the admissions after the first of September would have been larger with better transportation.

"The fact that two railroads—the Pennsylvania and the Reading—could carry but a little over a quarter of the passengers visiting the fair, and only about twice as many as the six horse-car lines, should be noticed, as well as that on "Pennsylvania Day" the Reading road, carrying the larger proportion of local travel, transported 185,000 passengers in trains averaging 502 persons; while the Pennsylvania road, dealing more with travel from a distance, transported but 58,374 passengers, in trains carrying 234 persons. On this day, according to the report of the Director-General of the Exhibition, which has been freely drawn on for the figures cited, 275,000 people were admitted to the Exhibition, and 50,000 more went to the vicinity without entering, calling for the transportation both ways of 650,000 people; of these only 50,000,

or less than 8 per cent., were classed as from without the city, and 115,000 were supposed to have walked. It was midnight before the crowds could get away, and only 12 per cent. of the 9,910,966 persons visiting the Exhibition were brought directly to the grounds by railroads from out of Philadelphia; the remaining 82 per cent. made some stay in that city. If the estimates of Mr. Goshorn were correct it seems that a large proportion of the visitors to our fair must be transported between the city and the fair grounds.

"In any estimate of the probable numbers attending the fair, it should be remembered that in 1876 we had a population of 44,000,000, with 1½ miles of railroad per thousand, and in 1892 we shall probably have 67,000,000, with 2½ miles of railroad per thousand inhabitants. And against the 800,000 inhabitants of Philadelphia in 1876, New York will then probably have over 2,000,000; so that both the strictly local admissions and those from a distance will be largely increased. And there is another circumstance that will be effective in increasing the number of visitors, which is that for the 30 years ending with 1876 there had been an almost continuous balance of trade against this country aggregating about \$1,500,000. That has changed since 1876, and we are about even now. The effects of this on the ease of the money market may be estimated by reference to the fact that the Chicago, Milwaukee & St. Paul Railroad issued bonds less than three years before the opening of the Exhibition, bearing 10 per cent. interest, and the same road is now borrowing at 4 per cent.

"Under these improved conditions it is probable that an expectation of an average attendance of 200,000 visitors per day for three months of the fair, with one or more days on which the attendance will exceed 350,000, would not be disappointed. This number would be increased or diminished by the ease and comfort with which the tired sight-seers could reach their homes; and for thorough convenience, 150,000 should be able to leave the grounds between 3 and 6 p. m., without delays on the platforms or crowding in the cars."

English Accidents.

The quarterly report of accidents and casualties on the railroads of Great Britain and Ireland for the first quarter of 1889 has just been issued, and we summarize below the reports of the Board of Trade inspectors on the 20 accidents which they specially investigated.

On the Caledonian Railway at Haugh-head Junction, Jan. 21, a tank engine drawing a passenger train jumped the track on a sharp curve just after passing a frog. The speed was about 25 miles an hour, and a number of cars were wrecked. The engine weighed 51½ tons, and as nothing in the track or engine was out of order, Gen. Hutchinson concludes that the heavy engine running at too high speed crowded against the guard rail so hard as to break it, thus allowing the wheels on the opposite side to take the wrong side of the point of the frog. As at sharp junction curves it is impossible to give a proper amount of super-elevation to the outer rail, moderate speed is very important. Ten miles an hour should have been the rule at this point. The inspector says that in an accident of this kind the engine should not be repaired until after the official inquiry.

On the same road, near Beattock, Feb. 19, a woman in a passenger car of a night train put her head out of the window and came in contact with a mail bag which had been hung out for the train to take up. She was stunned and died the next morning from concussion of the brain. Two other women were in the compartment with her, but seem to have been too excited to pull the bell-rope. Finally one of them went into hysterics, and her screams attracted the attention of a man in the next compartment, who pulled the cord and stopped the train. This was, however, not until 20 miles had been traveled. The inspector's discussion is chiefly about the manner of hanging mail bags, and the feasibility of hanging them further from the track, the present practice being to place them so as to clear a car from 8 to 13 inches. But the immediate cause of the trouble was that the mail car was in the rear portion of the train, the vehicles being in the following somewhat promiscuous order: Engine, tender, brake van, sleeping saloon, carriage truck, 2 composites, third class, brake van, post office van, 2 brake vans, 2 horse boxes, 4 fish trucks and brake van. The simple expedient of placing the mail car next to the engine, which would be an almost perfect precaution if bags were never hung out too long before the arrival of a train, seems not to have occurred to the inspector. The mail crane in common use in England consists of an iron upright with an iron arm swinging horizontally, working in a manner analogous to that of the common form of water column in use here.

On the same road, near Muchalls, March 9, an empty horse box next to the engine, in a passenger train, jumped the track while the train was running 50 miles an hour. Quite a wreck ensued, but no persons were injured, the Westinghouse brake having stopped the train quickly. The horse box weighed only about 7½ tons, and its wheel base was 9 ft. The buffers of the second horse box were 2 in. too low, and may have exerted a slight lifting effect on the adjoining vehicles. General Hutchinson says that such light, top-heavy vehicles, with short wheel base, should not be run at high speed, especially in the front part of a train.

At Citadel Station, Carlisle, Jan. 21, a collision occurred between a train just leaving the station and one coming in. The outboard engineer disregarded a signal which stood at danger. General Hutchinson thinks that it is a mistake to allow runners to draw along a platform line to a starting signal at danger on the expectation of its being lowered before it is reached. A rule required trains to run under control in this yard, but was worded in the usual fashion, and the inspector says it is too vague. "To make it of any real value some limit of speed should be defined if it is really intended to be obeyed. If not, it had far better be expunged from the rule-book." Had the outward train been supplied with a greater amount of brake power, instead of only having it on the tender and half the cars, the collision would have been less severe. The fireman gave the common excuse that he was firing as he approached the signal.

On Glasgow Union Railway, at Clyde Junction, Feb. 15,

a passenger train overran a home signal about ten yards and struck a freight train using a cross-over track. It appears that between the junction home and distant signals was another home signal for the protection of the switch to a side track. This intermediate signal was pulled off, while the other two stood at danger. This seems to have thrown the runner off his guard. The fireman, as in the preceding case, at Carlisle, was engaged in firing, but in this case the same inspector, General Hutchinson, censures him for not looking at the signal before beginning to attend to his fire. The guard saw that the train was running too fast, but applied the hand brake instead of the automatic vacuum. "In this he was sadly wanting in judgment." The intermediate signal referred to can be placed at danger by either one of two signalmen, one on each side of it. The interlocking is not first class and the inspector criticises it in a number of features. Only a portion of the wheels of the passenger train were braked.

On the Dundee & Arbroath Joint Railway, Feb. 12, at St. Vigeans Junction, the engine and two cars of a passenger train were derailed at a point where a violent collision had occurred the night before, necessitating extensive repairs to the track. The evidence was very conflicting, but Major Marindin believes the track had not been properly restored. The engineer in this case said he was running four miles an hour, while the trackmen standing by said 30 miles. The inspector says the curve, which was 545 ft. radius, should be 660 ft. "as it was returned when the line was opened."

On the Great Eastern, at Stoke Newington, Jan. 28, the engine and first two cars of a passenger train were derailed, injuring 32 passengers. The train was running at about 30 miles an hour, and General Hutchinson is unable to discover why it jumped the track. There was a broken rail, but the engine probably broke it. The engine was all right, the weight being equally distributed between the two sides. The rails were bull-head, laid in 1885, and weighed 80 lbs to the yard. Ten pounds of this had been worn off. The promptness of the engineer and front guard in flagging an approaching train on the opposite track is "much to be commended." The road intends to relay the rails very shortly, and General Hutchinson says "no time should be lost in doing so." The leading wheels of this engine carry 4 tons less load than the trailing wheels. As it is a tank engine, intended to run in either direction, this weight should be more equally distributed.

On the Great Western, near Cardiff, Jan. 19, a locomotive, standing close to a signal cabin, was run into by a passenger train running about 15 miles an hour. The collision occurred on a curve, about 8 p. m. It appears that the signal man allowed the man at the other end of the block section to admit the passenger train, when the empty engine had actually been standing near his cabin for some minutes. He was not aware that the light engine had been telegraphed to him from the preceding station, although he appears to have accepted it. It did not appear that he telegraphed it forward to the next signal station in advance. Colonel Rich makes no recommendations, and makes no mention of the value of electric locking of signals as a provision against mistakes of this kind.

On the Great Western, near Worcester Sidings, on the line to Hereford, March 27, a passenger train, consisting of an engine and two cars, was being pushed (backward) to ward Barton Station, when it ran into the engine of a freight train, which was doing some switching. A passenger car was derailed and several freight cars damaged. The cause of the collision was that the engineer ran past a distant signal, which was at danger. Colonel Rich remarks that pushing passenger coaches in front of an engine is dangerous, and has heretofore been condemned by the Board of Trade, and in connection therewith says that it prevents the runner from having a good view of the line; but he does not say that this mitigates the man's fault in this case. The other men on the passenger train appear to have paid no attention to the state of the signals, and they did not see the freight, although the accident appeared to have occurred in broad daylight. There was an automatic vacuum brake, but it could only be applied by the engineer. The guards could, however, have stopped the train without trouble, if they had observed the home signal, which was also at danger. The signal man is also blamed for not having cautioned the engineer before giving him the signal to run over the line on which the freight was at work.

On the Highland Railway, at Elgin, Feb. 16, a passenger train entering the station ran into an empty engine, doing slight damage. The road is single track, but in front of the station is a double track or loop line. The incoming train was to take the left hand side of the loop, and the engine which it struck had just been detached from a train which had arrived from the opposite direction, and was standing on the other side of the loop. This case seems to have been almost precisely similar to one which has frequently occurred on American roads. The detached engine proceeded to do some switching near the outer limits of the yard without proper protection. There was general carelessness, as it was known that the train was approaching, and there was a storm of snow and sleet which impaired the view, but Major Marindin places the chief blame upon the station agent's clerk, who lowered a starting signal, which permitted the empty engine to move, while at the same time the signals for the incoming train had already been pulled down. The company is blamed for allowing switching to go on outside a station loop in a case like this, after an approaching train has left the adjoining station. The inspector says this practice is forbidden on most lines. Had the levers been interlocked the conflicting signals could not have been given. The delay in interlocking the signals was due to some

negotiations with a connecting road as to an alteration at the other end of the loop; but it is pointed out that this is no excuse, as the place of the proposed change had no connection with the end of the loop where the collision occurred. It is further observed that the road had altered some switches without submitting the plan for inspection, according to law, and had thereby rendered itself liable to penalty. Finally, says Major Marindin, only two out of three of the vehicles composing the passenger train in this case being properly fitted with a continuous brake, the brake power was deficient. The cars are used in joint traffic, but the inspector says if the roads cannot agree to adopt the same brake both kinds should be put on them.

(TO BE CONTINUED.)

The Adams Journal Box.

The cuts given herewith show F. D. Adams' patent journal box, which has been in use on the Boston & Albany for the past two years, and is referred to in a letter from Mr. Adams, printed in another column. Fig. 1 shows the collarless form and Fig. 2 the form devised for the M. C. B. standard. The essential feature of the box is the manner of fitting at the inner end. As shown in the cut, a cast-iron ring is fitted tightly on the neck of the axle, close to the face of the hub of the wheel. Within this ring is placed a ring of wood fibre or leatheroid $\frac{1}{4}$ in. thick. This ring is pressed to a slightly convex surface, so that it has a little elasticity, which tends to keep it pressed tightly against the end of the oil box. The

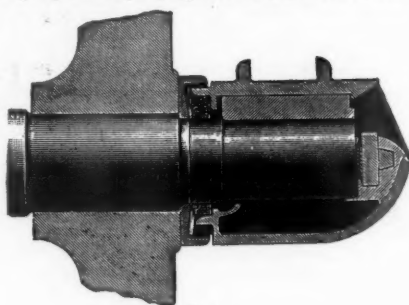


Fig. 1.

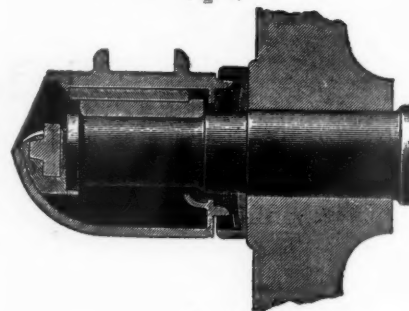


Fig. 2.

Adams' Journal Box.

iron ring forms a shield over the end of the box, which prevents dirt dropping upon the fibre ring. The journal and brass are further protected by a ring of felt, which fills the space between them and the leatheroid, and fits tightly on the axle. This absorbs all the dust that would otherwise get into the box. This felt, though, of course, not impervious to oil, absorbs it so as to make the box practically oil-tight.

Keeping the outer end of the box tightly covered appears to be simply a matter of careful workmanship and attendance. The face of the oil box is planed and the cover is made to fit it accurately. The common Fletcher cover is held in the usual manner by a single bolt at one end, passing through a strong coiled spring. It can be swung around freely, but a ledge on the box at the upper side of the opening serves to keep dirt out of the box.

The Boston & Albany now has 75 passenger and 100 freight cars equipped with this box, and the record of all the passenger cars is substantially a repetition of that given in Mr. Adams' letter.

American Railroad Statistics.*

[Concluded from page 509.]

PRINCIPLES INVOLVED.

4. We may divide railroad statistics roughly into those which are chiefly economic and those which are chiefly physical in their character. Under the latter head come statistics with regard to grades and curves, with regard to material used in construction, and with regard to accidents. Under the former head come the accounts of finance and business operations. It is to these that we shall devote chief attention.

A railroad differs from most other lines of business in the sharp separation between permanent and current expenditures. Every good system of railroad statistics takes full account of this, giving a description and financial condition of the property on the one hand as distinct from the operations on the other. The chief items of information under the former head are, first, length of line, length of track, and amount of equipment in various forms with the relation of these items to the area and population; second, cost of these various items as well as other accessory forms of property incidental to the operation of the road; third, means by which this cost has been met. This part of the subject is well understood. Every one agrees, for the most part, as to the questions which ought to be asked; the only difficulty is in answering them.

The easiest question to ask, and the hardest to answer, is, How are we to estimate the real capital of a road? It is well known that a large part of the stock is water, that is, does

not represent any money actually paid in. On the other hand, from time to time, it often happens that repairs have been paid for out of earnings, and are not charged to the general balance sheet at all. It is hard to tell what is the amount of these errors, and how far they balance each other.²

Another disputed point relates to the current assets and liabilities of a company. No road can keep its bills wholly paid up or wholly collected. The consequence is that it has some outstanding cash assets and some current liabilities. How far shall the latter be included in the capital account of a road? The Inter-state Commissioners have tried to settle the matter by having each road report its current liability balance, which hardly seems a satisfactory solution of the problem.

5. The difficulties in arranging the schedules under the current account of operations are far greater. Let us try to explain a few of the points involved, and then see how the different systems adopted meet the requirements of the case.

Among the current expenditures of a railroad there are always a number of purely financial ones, such as interest and rentals, which do not form part of the operating expenses in the narrower sense. These form, in all systems of railroad accounting a class by themselves, known under the general head of fixed charges.

There are, in the second place, a number of general expenses for salaries for general officers, outside agencies and advertising, legal service, and a variety of other things which attach to the operation of the road as a whole rather than any particular part of it. These form a second class.

There are expenditures for repairs in all conceivable forms, classified under the head of maintenance, and usually divided into maintenance of way and maintenance of equipment.

Finally, there are the direct and immediate expenses of transportation or of handling the traffic, which may be subdivided into two distinct heads, train service and supplies on the one hand, and station service and supplies on the other.

These distinctions are more important than would appear at first sight. It is characteristic of railroad economy that some of the expenses, like those of train and station service, vary in proportion to the traffic, while others are very far from doing so. An increase in the traffic does not necessarily bring an increase in the amount of general expenses, or even in the amount of maintenance charges, the latter being in many instances due to the weather rather than to wear. It is in the highest degree desirable that this distinction should be recognized in the statistics as far as possible. It is hardly too much to say that the merits of various arrangements of operating expenses depend largely upon the recognition of this distinction. The Saratoga classification made little attempt at arrangement of this kind. It simply divided the items under some twenty different heads, and left the different reports free to group these heads as they might choose. The United States Census went a step farther, and a long step in the right direction. Besides the distinction of fixed charges from operating expenses in the narrower sense, which every one recognizes, it made a further separation of maintenance of way and maintenance of equipment, but grouped general expenses, train service and station service under the one comprehensive head of "transportation." This was an error, but being an error of omission was not a very serious one. It simply requires the statistician, when he wants to draw conclusions on certain vital points, to add up various separate items for himself instead of having the work done for him in advance.

Some of the State Commissions have adopted substantially the classification of the United States Census. Others have gone farther, and have separated general expenses from transportation expenses, in the narrower sense. On the other hand, a few of the authorities and many of the railroads prefer a radically different division of the accounts, not making maintenance of equipment a separate head, but grouping locomotive repairs, with fuel and locomotive wages, under the general head of locomotive service, while car repairs were arranged under the head of train service in the same way. This practice has something to be said in its favor, especially from the point of view of railroad economy, but for the purposes of the political student it is not so good as the other; and we may congratulate ourselves that the Inter-state Commission did not adopt it, but preferred the New York plan; that is to say, substantially the one outlined at the beginning of this section.

Another thing done by the Inter-state Commerce Commission was not nearly so good. In their blank forms they attempt to separate all railroad expenses by an arbitrary apportionment to freight and passenger business.

At first sight this seems natural enough. Every one wants to know what it costs a railroad to transport a passenger or a ton of freight a given distance. The Commissioners so much desired this information that they have lost sight of the fact that it is in the nature of things not to be had, and that what they are getting is a false and arbitrary return which is worse than none at all. Their letter of instructions shows in an indirect way the fallacy involved. They say that in dividing expenses between freight and passenger business, those which are naturally divisible should be classed under the respective heads; those which are "not naturally divisible" should be apportioned in the ratio of the passenger and freight train mileage. This is purely arbitrary. If they are not naturally divisible why should they be artificially divided? How does the Commission know that a freight train mile should be equal to a passenger train mile in the amount of maintenance of buildings which it involves? How do they know that each should share equally in the proportion of the salary of the president chargeable to it? It is one of these cases where an attempt to divide is arbitrary in its resting on a series of unproved assumptions, and giving, in many instances, at any rate, fallacious results. Suppose that a given line of freight could not pay its share of the repairs of fences. Ought the railroad to discard such freight when it will contribute to the profits of the road without causing any additional damage to the property of the line from infuriated cows?

The expenses for train and station service can be apportioned and distributed. The expenses of passenger trains, and of agents at passenger stations, are directly chargeable to passenger service, and an increase in the amount of business done will bring a more or less direct increase in these expenses. The same may be said of the corresponding expenditures with regard to freight. To a considerable extent this is true of car repairs of various sorts. On the other hand, the general expense of maintenance of way and the interest do not increase with the development of new traffic. Suppose it costs 50 cents per train mile to carry a hundred passengers or 200 tons of freight. The direct expense of carrying such passenger is about half a cent a mile. The direct expense of carrying the freight is about one-quarter of a cent per ton-mile. Each of these things represents something tangible. Any business obtained at rates higher than this, provided it could be obtained on no other terms, represents so much gain to the railroad. The

² There is a possibility of mistake in attempting to compare mileage with area or population, because it is so easy to confuse the location of the reporting office with the location of the road itself, an error which has actually been made in the first of the statistical reports of the Inter-state Commerce Commission.

* A paper read before the American Statistical Association by Prof. Arthur T. Hadley.

fact that it appears to be done at less than the average cost of doing the whole business does not prevent its being good policy. The fact is, that the average cost of doing the whole business, itemized in the way that the Commission desires to see it done, is in the highest degree misleading. This is the most serious fault in the arrangement proposed by the Inter-state Commerce Commission, and we cannot help hoping that it will be modified in the course of time.

There is another system of division of expenses into movement and terminal charge. This has not been extensively adopted by the statisticians of this country; but the courts, both here and in England, have often tried to use it. The underlying idea is this: The expenses of handling any kind of traffic are partly independent of the distance and partly proportionate to it. Station expenses belong to the former class; train and track expenses to the latter. The theory is that the tariff for any distance should consist of a fixed terminal, plus a mileage rate proportionate to the distance. This sounds plausible; but it involves the same fallacy as the arbitrary distribution of freight and passenger expenses. Many of the things which are charged as terminals do not attach to any particular piece of traffic, but to the business as a whole.

This matter is so important statistically, and so frequently misunderstood, that I shall ask your pardon for reiterating it in another form.

A railroad loads a ton of freight at a cost of a dollar. When this is once in the car it can be carried at a cost of only a quarter of a cent a mile. With the increased distance only the latter element increases proportionately. So much for the distribution of terminal and movement expenditures. Now suppose the railroad gets twice as many tons of freight. Will all expenses double? Obviously not. There is a distinction between expenses which vary with increase of traffic and those which do not, analogous to that between terminal and movement expenses, but more fundamental and more important. The latter classification is well enough in its way; but in any good system of railroad statistics it must be made subordinate to the former.

6. In order that the figures of dollars and cents may mean anything, we must have an actual description of the work done. The statistical units of operation which are common to all roads and to all good systems of reporting in this country, are: 1. The number of tons or passengers handled; 2. The aggregate amount of transportation—ton or passenger miles; 3. The aggregate amount of train movement—freight or passenger train miles.

The second of these in a rough way represents the amount of public service done, and is the best thing with which to compare the receipts. Thus we find the average receipts of the railroad of the United States are 2.28 cents per passenger mile, and 1.06 cents per ton mile, while those of Prussia are 1.34 per passenger mile, and 1.34 cents per ton mile. In this way a measure of transportation service and transportation payment is obtained in something like tangible form.

On the other hand, the first and third are units of railroad service, and the expenses should, to a great extent, be compared with them. Thus, if we compare the station service expenses of freight and passengers, with the number of tons or passengers handled, we obtain a criterion of station economy. If we compare the train expenses with the number of miles run by the trains of the various classes, we obtain the results of train economy on the roads in question. The attempt to compare expenses with ton mileage or passenger mileage is simply a matter of convenience as furnishing the best common measure for train and station service, though inaccurate when applied to either of them separately.

The maintained and general expenses, as a criterion of general economy, should be compared, not with the operations, but with the track mileage. A mile of track to be kept in a good standard of usefulness, ought to require a certain amount of track-watchman's services, which will be needed, whether ten trains pass a day, or fifteen. Only in case of extraordinary changes in traffic should these items vary. The account of expenses on a given road is not completely or accurately presented by lumping everything in one sum, but by grouping the general expenses into one head, and the direct or distributed ones into another. We may thus say, with considerable approach to accuracy, that the ordinary expenses on the railroads of the United States is from \$3,000 to \$4,000 a mile, plus 40 to 60 cents a train mile, and the cases outside of these rather narrow limits will be few in number. But if we attempt to say that the average cost of handling a ton of freight is one cent a mile, we are dealing with a set of facts whose variations are so great as to render a generalization wholly useless. Under different amounts of traffic, roads which are otherwise alike may find a variation in cost of 400 per cent. It is obvious that it is in the highest degree desirable so to arrange our statistics as to guard against this danger.

In another year I hope to be able to present figures analyzed according to the principles here set forth. The present time is not a good one for the purpose. The United States census, which furnished an excellent basis in its time, deals with past history. The state reports are just being superseded; the Inter-state figures are still highly incomplete. It would be a waste of time and ink to do to-day what must be entirely set aside a few months hence.

TECHNICAL.

A Large Electric Lighting Station.

The London Electric Supply Corporation Works at Stowage Wharf, Deptford, is one of the largest stations in the world. It is built almost regardless of expense and is equipped with the largest dynamos yet made. The power is furnished by 40 Babcock & Wilcox water-tube boilers, made in Glasgow, about 200 h. p. each, arranged in two batteries of 20 each, and connected to separate chimneys of large dimensions. The boilers are fed with pumps. The firing is done by hand, and not by automatic stokers, as might reasonably be supposed to be the case in a new establishment. All the trimmings and the fittings are of the best quality. The power is transmitted to the dynamos by means of wire ropes—40 in. number and about 2 in. in diameter—from two 1,500 h. p. vertical compound condensing engines of the Corliss type, built by Harrington & Co., at Boulton. The engines run at about 80 revolutions and the dynamos at 80 revolutions. The dynamos are the largest ever built and will soon be started. They were constructed at the works of Maudsley's Sons & Field, in London, in all parts except those peculiarly electrical. Each dynamo is intended to generate a current sufficient to supply 20,000 incandescent lamps of 10 c. p. each. These dynamos are built on the Ferranti system; they are about 14 ft. in diameter, have 96 pole pieces and a thin armature disk at right angles, to which the poles are arranged. The wrought-iron pole pieces are cast into the cast-iron disks, which form the faces of the dynamos. The dynamo and engine room has two traveling cranes, arranged so as to cover all portions of the floor. These cranes are of 25 and 50 tons capacity, arranged for the purpose of removing all parts of the dynamos easily and quickly.

The Williams Hexagonal Turn Buckle.

Messrs. Anthony & McElroy, 328 Chestnut street, Philadelphia, are the Eastern sales agents for Williams' open hexagonal turn buckles, manufactured by the Central Iron and Steel Co., Brazil, Ind.

The nut or head of this turn buckle is the natural result from blanks used in its manufacture. It is not reinforced in any way, has but two weld lines, which extend from end to end, leaving virgin iron in the line of the opening, and partially sieving the bolt, giving it a neat, compact appearance. The ends are machine finished or chamfered. It is reamed and counter-chamfered the depth of one thread before tapping, giving easy entrance to the bolt.

Production of Bessemer Steel Ingots and Rails in the First Half of 1889.
The American Iron and Steel Association reports that the total production of Bessemer steel ingots in this country for the first half of 1889 was 1,268,496 gross tons, showing a gain of about 3 per cent. over the production of the corresponding period of last year, and the make of Bessemer steel rails was 642,473 gross tons, showing a loss of about 7 per cent. on our production of the first half of 1888.

The following table shows the production of Bessemer steel ingots in the first half of 1889, compared with the production in each half of 1888. The production of steel ingots by the Clapp-Griffiths process is included, but a statement is added of the ingots produced by this process alone.

	First half 1888.	Second half 1888.	First half 1889.
Ingots.	Net tons.	Net tons.	Net tons.
Pennsylvania.....	729,993	862,636	930,448
Illinois.....	321,115	292,741	245,171
Other states.....	333,180	265,855	244,796
Total.....	1,384,288	1,421,232	1,420,415

Clapp-Griffiths only..... 36,070 45,087 38,356
The following table shows the production of Bessemer steel rails of all kinds and sizes in the first half of 1889 compared with the production in each half of 1888. This statement does not include a few thousand tons of Bessemer steel rails which were rolled in iron rolling mills from purchased blooms.

	First half 1888.	Second half 1888.	First half 1889.
Rails.	Net tons.	Net tons.	Net tons.
Pennsylvania.....	420,101	491,105	523,882
Illinois.....	256,823	231,816	179,201
Other states.....	98,337	31,650	16,489
Total.....	775,261	754,571	719,572

The quantity of steel rails, 50 lbs. to the yard and upward, shipped from Jan. 1 to July 1, 1889, on account of 1889 allotments, is reported in detail by the Board of Control as follows: Illinois Steel Co. (North Chicago, Joliet and Union combined), 139,574 gross tons; Edgar Thomson, 134,700 tons; Scranton, 73,341 tons; Lackawanna, 63,763 tons; Bethlehem, 48,877 tons; Pennsylvania, 44,532 tons; Cambria, 29,240 tons; Cleveland, 11,368 tons; Troy, 2,280 tons; total, 546,675 tons.

The Sharpneck Anti-Friction Journal Box.

On July 30, at Chicago, a demonstration of the capabilities of the Sharpneck anti-friction journal box was given, attended by a large delegation of railroad men and press representatives.

An entire train, consisting of a baggage car and three coaches, which has been fitted up and is now running regularly on the Chicago, Rock Island & Pacific as the Peru accommodation, was placed at the disposal of the party. A run was made to Joliet, 40 miles, and return.

Leaving Chicago at 10:30, the run was made on the usual schedule time of express trains on this road until Blue Island was reached. Up to this point there was no opportunity for a fast run on account of the frequency of stops necessitated by the numerous railroad grade crossings and the restrictive ordinances of the city of Chicago, which now extends several miles into the interior of Illinois. After crossing the Chicago & Grand Trunk at Blue Island, there was a clear run of 22 miles to the Elgin, Joliet & Eastern crossing near Joliet. This distance was covered in about 25 minutes, some miles being done in less than a minute.

When the stop was made for the crossing the engineer discovered a hot eccentric on the locomotive, and took time to cool it down. During this delay some of the less confident ones ventured the remark that one of the patent journals had run hot. This caused a flurry, and the passengers alighted to investigate. The result was very agreeable to those interested as the boxes coming to a sudden stop after making this fast run were perfectly cool, and it was suggested that the inventor apply his genius to the eccentric and apply a roller bearing. Arriving at Joliet, the lid was removed from one of the boxes, and those present were shown the details of construction. The ease of starting a car equipped with this box was exhibited by a man of small stature pushing one of the passenger coaches up and down the track with no apparent exertion.

On the return trip a stop was made at Blue Island long enough to allow a committee to prepare suitable resolutions congratulating the inventor and promoters on the success of the device. Several speeches were made explaining the object and result of the experiments during the past two years. The engineer of the train said he now made a run of 280 miles on four tons of coal as against 156 with a similar train fitted with ordinary brass bearings. Coach No. 16 of the Chicago, Rock Island & Pacific, which has been in service about a year and a half was recently taken to the shop, and the bearings were found not to be appreciably worn after making a mileage of 50,000 miles. The present train has made 200 miles a day since July 3.

As most of our readers know, the Sharpneck box is a device for running the journals in rollers, and securing rolling friction only. Six rollers surround the journal, and within each large roller are seven small rollers, around which it turns, to distribute the friction between the roller and its axle. Each large roller consists of a cylinder of bell metal $3\frac{1}{2}$ in. in diameter and 10 in. in length. Through the center extends a steel pin $\frac{3}{4}$ in. in diameter, around which revolve the seven small steel rollers $\frac{1}{2}$ in. in diameter. The thickness of the cylinder shell is $\frac{3}{4}$ in., and each of the cylinders is $3\frac{1}{2}$ in. in diameter. The journal box therefore consists of a collection of rollers, each of which incloses yet smaller rollers, the whole revolving independently and yet together about a common center, the axle journal. There is a transverse roll on the top of the shell, carrying the load, which allows the rollers inclosing the shaft to work freely endwise, and prevents any end slip of the axle, which might otherwise create friction.

This journal as fitted to a transfer table in the Chicago, Rock Island & Pacific shops was illustrated in the *Railroad Gazette*, Jan. 20, 1888, page 37.

THE SCRAP HEAP.

Notes.

The General Manager of the Atchison, Topeka & Santa Fe has issued a circular to conductors that holders of passes, good within a single state, must not be allowed to use them for any part of a continuous inter-state journey.

Fifty freight conductors and brakemen on the branch of the Lake Shore & Michigan Southern, running between

Ashtabula and Youngstown, struck last week for three brakemen to a train instead of two. The company recently put a number of heavy locomotives into service, increasing the length of the trains from 25 cars to 40. The men were discharged.

In the United States Court at Little Rock, Ark., last week, Judge Caldwell rendered a decision in favor of the St. Louis, Iron Mountain & Southern and the Hot Springs roads, who were charged by the Little Rock & Memphis with discrimination in favor of another line in making through rates over it to the exclusion of the plaintiff. Judge Caldwell held that there was no power in the laws of the United States, either in the Inter-state Commission or in the United States Courts, compelling one railroad to enter into a convention as to rates with competing roads.

The ruling passion is strong in everything, even remotely connected with railroad business. The fellow in the subjoined squib from the *New York Weekly* had probably served an apprenticeship in the freight claim department:

"Messenger (going through western railroad train)—Want dinner at Scrogg's Corners?"

Starving passenger—"Indeed I do."

Messenger—"One dollar, please."

Passenger—"What do you want pay in advance for?"

Messenger—"Sometimes the train is late and don't stop."

The value of careful selection for location of signs of stations, streets and public passages is well brought to the mind of the stranger in London. He finds it difficult to determine the name of a station on the underground road because the most prominent lettering is that of the advertisements with which the walls are covered. While riding recently in one of the trains a youth of some ten summers was endeavoring to decipher the names of the stations as they passed for the benefit of the passengers. The location of the train varied in the youthful mind all the way from "Athlophorus" to "Sunlight" and "Pears' Soap." In most cases the only trace visible of the original station signs is the well-worn, dingy legend on the backs of the settees. The New York Elevated stations shine gloriously in comparison.

English Accidents for Three Months.

The Board of Trade return for the quarter ending March 31 last shows one passenger and no employes killed, and 224 passengers and 41 employes injured by train accidents. Seventeen passengers and 100 employes were killed from causes other than train accidents, etc., and these added to the 16 persons killed at highway grade crossings and 87 trespassers, with 4 miscellaneous, make a total of 225 persons killed. The total number injured is 1,139. There were 30 collisions, in which 38 passenger trains were involved and 11 derailments, of which 9 were to passenger trains. The principal other item was that of 53 failures of axles, one of which caused the death of one passenger and the injury of 63 others. Notes of some of the more important accidents will be found in another column.

Transfer of the Sutor Tunnel.

A deed was executed by the United States Marshal at Virginia, Nev., Aug. 3, conveying to the Union Trust Co. of New York, all property of the Sutor Tunnel Co. included in the sale of Jan. 14, 1889, at which they bid it in for \$1,625,000.

Explosion in an Express Car.

When the night train from Montreal to Quebec, on the Grand Trunk, one night last week, had gone through the Victoria bridge and passed St. Lambert, an explosion occurred in the express car, by which the express messenger was killed and the car wrecked. No cause can be assigned for the explosion, but it was at first thought that an attempt was made to blow up the bridge. There was a quantity of fireworks in the car, but these did not explode until some time after the fire started. The express car and locomotive were detached from the rest of the train by a brakeman, and the engineer ran them up the road and on a siding, notwithstanding the intense heat from the fire. The train was well filled with passengers.

New Railroad in Jamaica.

A party of civil engineers left New York last Saturday in charge of Chief-Engineer Latam, to survey a new railroad in the Island of Jamaica. The new road will be about 120 miles in length. E. L. Frank, 52 Exchange Place, New York, is interested in the project.

The Western Train Robber.

On Aug. 4, as the Wabash train for St. Louis, which leaves Kansas City at 8:20 p. m., had crossed the Missouri River and reached Harlem, a suburb of Kansas City, three young men who were in the rear car pulled out revolvers, and while two stood at the doors, the other compelled the passengers to give up their valuables. As they were passing into the St. Louis sleeper, they were met on the platform by the conductor. As soon as he was seen by the robbers two of them aimed their revolvers at him, but the conductor quickly raised his lantern and struck one of them in the face, and then retreated into the St. Louis sleeper. The train was going 30 miles an hour, but the robbers jumped off and escaped. They secured about \$1,000.

The South bound mail and express train on the Fort Worth & Denver City was also entered the same day by six masked men, early in the morning, between Cheyenne and Tascosa, in Oldham County, Texas, about 200 miles south of Denver. The train robbers detached the passenger coaches from the express car and locomotive, and then compelled the engineer to force open the door of the express car. Before this was done the express messenger had concealed most of the express packages, but about three packages of money were obtained. The mail car was then entered, but most of the valuables there had also been hidden. About \$2,000 in money was secured. The passengers were not molested. A number of shots were fired by the train robbers, but none of the train hands were injured.

Information reached Denver on Wednesday of a daring attempt to rob the Denver & Rio Grande passenger train at a point on the Utah line near Crevasse. Two of the robbers boarded the baggage car at Thomson Springs. They climbed over the car to the engine and pointed revolvers at the heads of the engineer and fireman and compelled them to stop the train. Then they forced the fireman with an axe to chop through the door of the express car, and made the engineer bring a bag to hold the plunder. Messenger Willis was ready with a magazine shot gun and two self-cocking revolvers. The fireman was unable to chop the boiler iron door. The robbers fired a dozen shots through the car. The messenger, who lay on the floor, was not hit. The robbers dared not show their heads at the windows lest they should be shot. They gave up the job finally and joined two other robbers in the other cars. The four went through the train with their revolvers drawn and gathered \$900 and 20 watches. One passenger put his head out of the window to see what was going on, and the robbers sent a bullet through the hat. Most of the passengers hid their valuables successfully, those losing them being too frightened to hide them. Sheriffs and others with bloodhounds have gone to look for the thieves.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

Mr. Walker's decision on northwestern coal rates is interesting. The gist of the case may be stated in a few words. Hocking Valley coal could be carried to certain northwestern points via Lake Superior much cheaper than by the existing tariffs over any other route. The St. Paul road felt the necessity of sharing in this trade. Having no Lake Superior line of its own, it reduced its rates via Milwaukee. The Northwestern made a corresponding reduction in Chicago rates. If the Lake Superior lines met this we had the beginning of an apparently endless struggle. The whole matter was referred to Mr. Walker for arbitration, and he decided that the roads from Lake Michigan should restore rates, and abandon the attempt to compete for the traffic which could be so much more cheaply handled via Lake Superior. The award is important as marking an attempt to divide the field instead of to divide traffic. Where the former result can be accomplished it is vastly the better of the two. It produces more economy, because each road serves the district which it can best reach; it produces less friction, because when such an award is once accepted its execution takes care of itself. Perhaps the chief advantage which English roads have over ours is that they have learned this lesson. It is not likely that we shall soon make as much progress as England has done in this respect. The rapid growth of the country and the constant building of new roads makes any such division at best only temporary. But the acceptance of an award of this kind would mark decided progress.

The fight between the Canadian Pacific and the Southern Pacific has been settled by the adoption of a 28 cent differential in favor of the former line, applying to Boston as well as New York. Whether this will be small enough to prevent the continued diversion of through traffic from American roads is very doubtful. The attitude of the Southern Pacific people during the early stage of the contest indicates that they do not regard it as satisfactory. They wanted to fight, and did not because they could not. If the United States roads are subject to the restrictions of the long and short haul clause, while the Canadian roads are not, the former will have much greater inducements to keep out of a fight than the latter. The Canadian roads know that such is the case. The Canadian Pacific probably does not care to fight; but it is extremely glad to bluff, and the knowledge that it has almost nothing at stake, while its opponent has a great deal, is a vast help in any game of bluff like that which has been going on in the last two weeks.

Some of the newspapers ridicule the idea that reductions in railroad rates can produce a commercial crisis. They say that a crisis is due to the failure of debtors to meet their obligations; that railroad stocks are not owned by debtors, but by creditors; and that a reduction in their value, whether justified or not, can by no means produce a crisis. Such writers confuse a commercial depression, or crisis in the proper sense of the word, with the panic which often comes at the beginning of such a period. Reductions in railroad rates are not

likely to produce a bankers' panic; but the panic is neither the only cause of a crisis nor its chief evil when it does come. The crisis of 1884-1885, though very severe, was not preceded by a panic. The distinctive features of a crisis are the unproductiveness of investments and the consequent stagnation of industry. That reduced rates can make railroad business unproductive we see only too clearly. That they produce a corresponding temporary gain to the shipper by no means appears; that in the long run they produce a loss by the curtailment of railroad facilities is a plain lesson of economic history. Though they do not operate in quite the same way as a financial panic in producing commercial depression, they are an independent cause, almost equally potent at the time; and even more lasting in its effects.

Chairman Aldace F. Walker, of the Inter-state Commerce Railway Association, has lately issued a number of important papers. From the first to the last one—on coal rates to the Northwest—they are all marked by a firm grasp of the subject, conservatism and common sense. Chairman Walker's characteristic seems to be a broad-minded way of considering those complicated rate questions. He was without doubt one of the members of the Inter-state Commerce Commission to whom both railroads and the commercial world looked for broad views and not for legal points only. Judging from his record thus far the Association made no mistake in offering Mr. Walker the position of chairman. We have had occasion to dissent from some of his opinions, especially in the Alton lumber case, but bear testimony to the fidelity with which the interests of the railroads as a whole have been guarded while in his keeping.

The exhibition run of a train equipped with the Sharpneck anti-friction journal-box, described in another column, deserves the attention of the mechanical reader. Anti-friction metals and bearings are so common, and many of them so ephemeral, that a natural distrust is engendered. It is not a difficult matter to provide a car with journals which shall give fine results for an experimental run; but the true test is long-continued service. In this respect the journal-box above mentioned appears to have established a record which shows decided merit.

The interesting communications on the counterbalancing of locomotives, now appearing in our columns, are well worth the careful attention of railroad men. It being impossible to accurately counterbalance a reciprocating weight by a revolving weight, at all points of the stroke or revolution, an approximation is the only solution with the ordinary type of locomotive engines. Engineers who have investigated the subject are well aware that the statement of a locomotive being perfectly balanced at one speed and out of balance at another is only another way of saying that the effect of unbalanced moving weights, scarcely perceptible at certain speeds, becomes a matter of serious importance at other speeds. A machine which is really counterbalanced is in perfect balance at all speeds; because, as well formulated by Mr. C. P. Seymour, "To rotate without jar, a revolving body must rotate around its centre of gravity, and must have no tendency to change its plane of rotation, i. e., it must be in standing balance."

Designers of locomotives do not have a monopoly of the problems involved in balancing steam engines. The subject has assumed formidable proportions in stationary and marine practice of late years, with increasing speed of rotation. An engine firmly secured to a foundation, or bed-plate, is apparently more favorably situated than is the engine of a locomotive. But in any case, however the engine may be attached, if unbalanced forces are acting the tendency will be to tear the engine from its supports, or to rupture some part. In stationary and marine practice, two general methods of overcoming the difficulty are employed. Either the bed plate and foundation are made very strong at the points exposed to excessive strains, or the design of the engine is changed so as to render the action of the reciprocating parts equal and opposite, thus neutralizing all prejudicial strains. The latter method is the natural one, and the former method a makeshift, called out by the exigencies of the case.

The locomotive engine may be said, in one sense, to have its foundation on the rails, for the reason that it is not attached to a fixed bed plate, and the consequence is that unbalanced strains tend either to derail the machine or to strike blows upon the rails. Thus the average tractive force of the locomotive is considerably diminished. The extraordinary tractive force, in proportion to their weight, developed by electric locomotives has frequently been remarked; but it is apparently due to the fact that these motors are in

perfect balance, and consequently exert a uniform tractive force in proportion to their weight at every point in the revolution of the driving wheels.

Several special forms of locomotives have been constructed, or proposed, with a view to securing perfect balance. The fine performance of the Shaw locomotive, in 1881, will be remembered by many of our readers. This locomotive had four cylinders, two on a side, with the cranks at angles of 180 deg. A few weeks ago (page 481, July 19) we published a notice of another 4-cylinder engine, in which the reciprocating parts balanced each other. The present number of the *Railroad Gazette* contains a proposition for a novel arrangement, and the writer shows that the supposed difficulties from pistons moving simultaneously can easily be overcome. Indeed, in stationary and marine practice, it may be said that the use of a single engine is peculiarly an American idea, and has never given rise to any serious trouble if ordinary care is exercised by the engineers. The plan proposed by Mr. Booth does not counterbalance the reciprocating parts, but diminishes their prejudicial action to a considerable extent. If, as seems probable, the difficulty of operating locomotive engines when the cranks are not set at an angle of 90 deg. is largely imaginary, it might be worth while to try the experiment of running an engine with the cranks at 180 deg., and removing all counterbalance, except that required for the cranks and pins. Such an experiment would call for few changes, and might give useful results.

The Exhibition of 1892.

The great enthusiasm in the city of New York over the project of holding a world's fair in 1892 does not seem as yet to have crystallized, so to speak, regarding a very important point—the selection of a site. The discussions in the daily press have brought forward many visionary schemes, but not much of any practical merit. The meeting for preliminary organization, held at the invitation of the Mayor a few days ago, suppressed vigorously all references to the choice of ground—it being apparently the general opinion of the organizers that the site should not even be discussed before various other preliminaries had been settled. Such an unusual course of proceeding must be assumed to have good reason for its existence; and those who recollect how the project of an exhibition in the city of New York has been abandoned on previous occasions, for the reason that no agreement could be reached about the site, may be pardoned for wondering whether this question has become more easy of solution with advancing years, as the land of the city is even more thickly settled than it was when the project was previously discussed. The numerous sites suggested by irresponsible correspondents in the daily press show that the problem is not absolutely incapable of solution; and since the places which are convenient of access both by land and water are not very numerous, it might be as well for the organizing committee to attack this question at once, and not hazard the success of the exhibition by useless delay. This, at least, seems to be the lesson which should be drawn from previous experience on the subject.

One of the most essential points connected with any site is its accessibility, both from the heart of the city and also from the surrounding territory, both land and water. For the installation of the exhibits and the removal of them and the surplus materials of buildings at the close of the exhibition, there must be convenient access to the grounds by railroads, and at least one of these roads must have a convenient terminus on a navigable water front. A distance of a mile or so from the deep-water dock makes little difference, as all freights must be reloaded at any rate, and the extra cost of transportation will be slight. But that ample facilities for receiving and dismissing great crowds of passengers in the shortest possible time should be afforded is of vital importance. Previous experience seems to indicate very clearly that by far the larger share of visitors to an exhibition in the vicinity of New York will have to be carried daily to and from the residence and hotel portion of the city, the centre of which we may assume to be between Tenth and Fifty-ninth streets, and between Third and Eighth avenues. It is also essential that the facilities for these people should not be confined to one mode of transportation. Visitors should be able to ride in steam cars, horse or cable cars, in steamboats or in carriages, as they could best afford or felt most inclined, and that at all hours of the day, and with the least necessity for passing through disagreeable or crowded districts.

It needs but a slight study of the map of New York and its environs, on which existing routes of transportation are laid down, to fix upon at least one site which combines all the requirements outlined above,

It is comprised in about 400 acres of unimproved property just north of the Harlem River, between the Harlem division of the New York Central & Hudson River Railroad and Jerome avenue, embracing the Fleetwood Park racecourse and the new Claremont Park. The advantages of this site were pointed out by Mr. J. J. R. Croes, in a pamphlet issued in 1880, the substance of which was reproduced in the *New York Times* of July 21 last, and additional arguments in its favor are given by Mr. E. P. North, in the *Engineering and Building Record* of last Saturday. Both of these engineers were long connected with the Department of Public Parks when it was not under purely political control, and, therefore, had exceptional opportunities for becoming familiar with the whole territory lying north of the Harlem River, Mr. Croes having had charge of the designing of the street and sewer systems and Mr. North of the maintenance of roads and streets. We give elsewhere some interesting extracts from Mr. North's article.

In discussing the question of transportation it is pointed out that from the central portion of the tract in question, and without the construction of anything more than a station and switching tracks, four trains can be dispatched at once in different directions on main lines of travel without interfering with each other, or with the regular business of the roads. Passengers could thus be carried over the New York Central, (main line), the Harlem, the New York, New Haven & Hartford, and to the Grand Central Depot, and also over the Port Morris Branch of the New York Central, which could carry between the grounds and Port Morris (where there is water deep enough for ocean, Sound or river steamers), as many passengers as any probable number of Sound or harbor craft could handle. The Second and Third Avenue Elevated lines, in connection with the Suburban Rapid Transit road, now deliver passengers as far north as 170th street, which is near the farther limits of the proposed tract and the Suburban has the right to build a connection across the Exhibition Grounds from its Third Avenue line to the New York & Northern bridge at Eighth Avenue and 155th street, thus affording direct communication between the grounds and the entire elevated railroad system of this city, as well as the New York & Northern and Yonkers Rapid Transit roads. There are also the Third, Madison and Eighth Avenue lines of horse cars, and the cable road on Tenth avenue, which have their present termini within less than a mile of the grounds. For driving to the grounds the facilities, among which are the new Manhattan bridge, are unrivaled.

On the whole, Messrs. North and Croes have framed a pretty strong argument for the location they advocate. Comparing this with other sites to the north of the city which have been proposed, the cost of transportation is an important element. Irrespective of the cost of construction of four miles of new lines necessary to reach either Pelham Bay Park or Van Cortland Park, which would be not less than three million dollars, the time consumed between the residences of the city and the exhibition grounds would be probably 15 minutes more per trip to the farther points, or half an hour per day lost to each of the thousands of visitors to the exhibition daily. Train expenses would be increased, and probably fares would be made higher.

While other sites proposed have their advantages, their disadvantages, so far as accessibility is concerned, are of such a general nature that there would seem to be no ground for extended dispute. The suggested use of Governor's Island seems, when the transportation facilities are considered, nothing less than preposterous, and the question of getting from the central and upper portions of Manhattan Island to any point across the East or North Rivers, or in the direction of Staten Island, is different chiefly in degree, very little in kind, from that of reaching Governor's Island. It is an important desideratum that people should make the whole journey in one conveyance, if possible, and when not possible, to approximate as nearly to that as may be. To conveniently reach Brooklyn, Jersey City or Staten Island from what we have termed the central portion of New York, would necessitate direct ferries from the transverse streets between Fourteenth and Fifty-ninth. But it is a long journey from Broadway to either river throughout the whole of this territory, and no good sites have been suggested which are so situated that such ferries could land people near their final destination. Furthermore, many people would ride in the cars a portion of the distance, and it is certain that any attraction which could be reached through the southern portion of New York City would crowd the elevated roads; and if these roads are already over-taxed in any portion, it is just here; and the over-crowding is just at the time of day when the visitors would desire to use the trains. We have the Brooklyn Bridge, it is

true, but we have only one, and the capacity of its railroad is already pretty well taxed. The Hudson River tunnel is a possibility, but the question of its terminus in New York City, to say nothing of connections on the other side, is not only still unsettled, but one whose satisfactory settlement is involved in many difficulties.

In truth, the strongest argument in favor of holding the exhibition at some point to the north of the city lies in the fact that our present means of communication already use a large percentage of their capacity, and that the prevailing currents of traffic are such that any large temporary increase can be satisfactorily handled in only one direction. The elevated trains which run southward in the morning, are already over-crowded, and, without additional tracks, there is not much room for improvement. In the afternoon, the same facts apply to the north-bound movement; but northward in the morning and southward in the afternoon, large numbers of practically empty trains are run, and these constitute the most safe, pleasant and expeditious means of moving large numbers of people. The Eighth Avenue Line of the Elevated can be extended directly to the proposed grounds, and the Second Avenue Line almost reaches them now, as has been pointed out. The whole line is not controlled by one company, but it would be important that trains should be run through. The construction of additional tracks on the present lines north of Ninth street is among the possibilities. As regards empty cars going north in the morning and south in the evening, the New York Central is in about the same situation as are the elevated roads.

The general objections to the Fleetwood site—and these lie against any other locality in that region—are the crowded condition of all our present lines, and the necessity of crossing the Harlem River over draw-bridges. But the New York Central, with its first class road bed and four-track line, can take trains of fifteen or twenty cars each, at intervals of 2 to 2½ minutes, and can make quick time. Its superiority in the matter of time will offset the long journey which would have to be made by many persons in New York City to reach the Grand Central Depot, as compared with the accessibility of an elevated station, and would give the Central a large share of the traffic. With the double-tracking of its Port Morris Branch, and possibly the running of a line from this branch across the main line of the Harlem on an overhead bridge, the deep water wharves at Port Morris could be made a terminus for transfer boats or ferries of the largest kind, coming direct from the Jersey City terminals of the trunk lines from the West.

Mr. Croes' statement that the receipt and delivery of traffic at the proposed site would not interfere with the regular business of the roads is of course to be accepted only in the most general sense. To smoothly handle 100,000 to 300,000 extra passengers in a day the surface roads of New York and vicinity, with their numerous annoying limitations, will have to be exceedingly "wide-awake."

Remedies for Canadian Competition.

Chairman Walker's letter to Senator Cullom, in response to the invitation to appear before the Senate Committee, contains a good deal of sensible comment on Canadian competition, which contrasts favorably with the average matter to which the Committee has been treated. He says that all which the American roads need is to be put on even terms with foreign rivals; and he implies that the Canadian roads should be subjected to the requirements of the Inter-state Commerce act as to relative rates on through and local traffic even if an international treaty were necessary for the purpose.

We agree with his first proposition more unreservedly than with his second. We believe that it will be easier to free the American roads from the short-haul requirement than to impose it upon their Canadian rivals. In the first place, it is doubtful whether the American lines are subject to it as matters now stand. The Louisville & Nashville decision allows exceptions to be made under stress of foreign competition of controlling force not subject to the authority of the act. This clearly applies to the matter in hand. That the competition exists, and is not subject to the provisions of the act, is denied by nobody. That it is of controlling force is clear enough from the amount of traffic which the Canadian lines have been able to divert. Canadian earnings have increased, while American earnings have failed to do so. As far as the Louisville & Nashville decision is concerned, it sanctions the disregard of the short-haul principle.

The trouble is that the Commissioners were not content with the broad principles laid down in that case, but became much more radical. If they did not actu-

ally compel the railroads to conform to the short-haul principle in cases where the Louisville & Nashville decision would have allowed an exception, they at least brought strong pressure to bear in that direction. This pressure reached its maximum just about the time when the Commission wrote its second annual report. Since then there has been something of a reaction. The Commission has found that the strict requirements as to tariffs have caused evasion in the form of special rates and secret rebates. It has found that the financial losses of the railroads during recent months, no matter what their cause, made it harder to apply the law strictly. On the whole, the recent decisions of the Commission show a tendency to go back to the less strict policy which prevailed at the outset; and the extra-judicial utterances of Judge Cooley show the same tendency in a still more marked degree. To put the matter in homely language, the Commission bit off more than it could chew, and has found it out.

If a railroad a year ago had announced an intention to disregard the short-haul clause systematically in cases of Canadian competition, it would have got into trouble. To-day, we do not think that it would. At any rate, we should like to see the experiment tried. A good, square fight on this matter would clear the air. If an American road were stopped by government authority when it was attempting to protect our share in transit trade, it would arouse a patriotic feeling which would be worth everything as a basis for securing a modification of the law. But if the American road were not stopped, and won the fight, the result would be worth more in controlling the Canadian Pacific than a dozen treaties or a hundred acts of Congress. If Commissioner Walker had laid more exclusive stress on this phase of the matter, and less on the other possible alternative, we should have liked what he says even better than we now do.

Chicago & Northwestern Report.

The Chicago & Northwestern report (summarized in our last issue) is always one of the noticeable ones of the year, from the representative character of the road, its able management, and the statistical information. In passenger matters there have been no special changes. The number of passengers carried increased 678,543, and there were 1.4 more passengers for each train mile run; but the average distance for each passenger decreased nearly one mile, showing that the increase came largely from local travel. This, and the fractional reduction in fare per mile, neutralized the gain in numbers, so that the gross passenger earnings were about the same as in 1888.

In freights the matter is more complicated. The number of tons handled increased 242,400, but there was a noticeable decrease in the distance each ton was carried, this falling from 177.69 to 161.79 miles, being the shortest average since 1884, when the system comprised 3,719 miles. It is to be regretted that, for the first time in its history, the Northwestern omits the usual monthly table of its earnings. Of course, the items of gross earnings and expenses are reported monthly to the exchanges, and are therefore accessible; but the omission from the report seems to show concealment, and this, whether just or not, is always to be avoided. These reported earnings show a large falling off up to January 1, 1889, when the "Presidents' Agreement" went into effect. Previous to that date the demoralization of rates was extreme; but the figures we have just quoted show that the Northwestern pursued a conservative course, even in that trying time, and lost a share of its long-distance traffic in consequence, the great decrease of 14 miles in the average haul of each ton pointing to the fact that the increase in tons handled was, as in the case of passengers, from the growth of local business. The policy of the company, apparently, is to get paying rates for competitive traffic, and, if this is not possible, to give more attention to local needs and industries.

This policy enabled the road to reduce the expenses of train service. The total mileage of freight trains was 1,323,216 less than in 1888. This encouraging result in the face of a larger number of tons handled was brought about by close and thorough study; for the number of tons carried per train-mile increased three tons, while the number of freight cars to a train increased .87 of a car. In the same way the total number of loaded cars hauled was 160,447, and of empty cars 8,644, less than in 1888.

This told at once on the operating expenses, for of the total decrease in transportation the three items of wages of engineers and firemen and fuel for engines constitute 80 per cent. Maintenance of way decreased \$30 per mile, showing economy, but nothing more. The Northwestern has always been generous to its road-

bed, and could, if necessary for a time, stand a still greater reduction than this. In like manner the figures for maintenance of engines and cars show that there is no deterioration, though repairs have not been quite so freely made. The saving is:

On maintenance of way	\$84,733
cars and engines	198,667
Transportation	306,001
Taxes	54,105

Total reduction in expenses \$643,511 which is almost the same amount as the surplus after deducting interest and dividends from net earning.

The loss of \$925,151 from freight on the Iowa and Galena divisions can only be explained, as before remarked, by the loss of competitive traffic. The rate per ton per mile could otherwise hardly have shown a small fractional increase. Why cannot our larger systems give the public yearly the statistics of their divisions separately? It would help us greatly in determining some of the disputed points in transportation. The Louisville & Nashville gives these figures by divisions and branches and deserves great credit for so doing.

Construction for the year amounted to \$2,450,602 and cash proceeds to help make up this amount from its own surplus of trans-Missouri lines and land sales, amounted to a little over a million. The report for 1888 said: "This class of expenditures is ever recurring with each succeeding year, and should be met as far as possible from the average yearly surplus which the company should be permitted to earn from reasonable charges for its business after payment of operating expenses, fixed charges and dividends." It is hard for an expanding system to accomplish this, and the increasing pressure upon the roads in the Northwest must make it specially hard in that territory. State reductions, inter-state restrictions, secret rate-cutting and demoralization, as well as the opening of strongly competitive routes by lake and by rail, will make the payment of construction accounts from savings very difficult for the immediate future.

The American Engineers' Tour in Europe.

The joint society of American engineers travelling in Europe disbanded at a final meeting, held in the room of "The Société des Ingénieurs Civils," No. 10 Cité Rougemont, Paris, during the last week of June. At this meeting the warmest expressions of appreciation were shown for the leaders of the party, whose continued efforts had brought about the success of the tour under circumstances which were trying to the utmost, both to health and patience. A vote of thanks was tendered to Mr. Henry R. Towne, of the Yale & Towne Manufacturing Co., whose untiring efforts as chairman of the joint societies contributed much to the satisfactory completion of the programme. The manner in which the burden of the position of secretary was borne by Mr. Charles Kirchhoff, Jr., editor of the *Iron Age*, assisted by Mr. George M. Bond, Mechanical Engineer with the Pratt & Whitney Co., was pleasing to all, and the vote of thanks and general expression of the members of the joint societies testified to the gratefulness of the members of the party for many personal favors granted by these gentlemen. The duties of treasurer were performed by Mr. Alfred E. Hunt, of Hunt, Clapp & Co., Pittsburgh, in such an able manner that all delays and impediments to the settlements of bills, so difficult to avoid under circumstances of this kind, were avoided entirely; the treasury showing a handsome surplus at the time of disbanding. The gentlemen selected as officers of the joint society, at a general meeting, held in Liverpool at the time of the landing of the steamer from the United States, are well known to the members of the engineering fraternity in America, and their names are sufficient guarantee that the speeches made and the conference committees appointed were of a character which gave to the American engineers in Europe and their colleagues at home that tone of honor, intelligence and dignity which they possess, and have well earned. They were, besides those named above:

D. J. Whittemore, honorary chairman; O. Chanute, C. J. H. Woodbury, Thomas C. Clarke, Prof. F. R. Hutton, William H. Wiley, A. Dempster, William Kent, James Archibald, S. W. Baldwin, Clark Fisher, J. T. Hawkins, Dr. Herbert G. Torrey, William Forsyth, Oberlin Smith, E. B. d'Invilliers, C. E. Emery, honorary secretary.

The success of the tour was, however, not alone due to the Americans themselves. To omit mention of the almost herculean efforts of Mr. James Forrest, Secretary of "The Institution of Civil Engineers of Great Britain," while the party were on English soil, and the labors of Mr. James Dredge, one of the editors of *Engineering*, before and after the arrival of the party on French soil, would be indeed ungrateful. Those who remember the earnest and laborious efforts of Mr. Forrest during the hot days in June while piloting about three hundred apparently willful and headstrong, but, in fact, characteristically restive and enthusiastic Americans, through the mazes of Windsor Castle, Houses of Parliament and other grand edifices, will concur in the statement that to Mr. Forrest is largely due the success of the entertainments in England. In Paris, to the difficulties already existing at the time, was added that of a change of language, but the labors of Mr. Dredge in advance of the party to a large extent removed the difficulties arising therefrom. The perplexities of some of the party can be better appreciated, perhaps, by an anecdote related

of one, who, after being twelve days in Paris, had to walk to the rooms of the society of engineers in order to find some one who could hire a cab for him to go to the railroad station. This should not be taken, however, as a general indication of the knowledge of the French language acquired by the Americans, as many of the party could speak French fluently, and the speech made by Mr. Towne in the Eiffel Tower was delivered in French.

To show the extent of the travels of the American engineers, the entertainments given and the engineering works visited, the following almost complete programme is given. It should be remembered that the party was divided in several cases, in order that the whole plan might be carried out; therefore all of the places were not visited by any one member of the party: Excursion over the Mersey docks and harbor estate at Liverpool, with luncheon on steamer; Messrs. Laird Brothers, Birkenhead Iron Works, with luncheon at afternoon reception given by Mr. and Mrs. Laird; Mersey Tunnel Railway and ventilating apparatus; Manchester Ship Canal, at Liverpool; official reception by Mayor of Liverpool and Conversazione at Town Hall of Liverpool; twenty engineering works in the vicinity of Liverpool; the London & Northwestern shops at Crewe, with luncheon and entertainment by Mr. F. W. Webb, mechanical engineer; Manchester Ship Canal, at Manchester; Lancashire & Yorkshire shops at Horwich, near Manchester, with entertainment by Mr. J. A. F. Aspinall, mechanical engineer; tour of North Wales; tour of the English lakes; tour through the Midland counties; the Midland shops at Derby, with luncheon by invitation of the company; Choral Service, Westminster Abbey with special address by the very Rev., the Dean, Dr. Bradley. House of Parliament, Windsor Castle, St. James Palace and Buckingham Palace, by special permission of Her Majesty, the Queen. Formal reception by the institution of Civil Engineers in Guildhall, London. East and West India, Royal, Victoria and Albert docks. Becton Gas Works, with luncheon by invitation of the company, Metropolitan Main Drainage and Sewerage Purification Works at Barking, Foundation and Piers of the Tower Bridge, Messrs. Humphrys, Tennant & Co.'s Marine Engine Works, Deptford Pier, Messrs. Yarrows' Shipbuilding and Torpedo Yards, Isle of Dogs, Docks and Goods Stations of the North London Railway, Messrs. J. & G. Rennie's Marine Engine Works London Hydraulic Power Co.'s Station, Mr. Peter Brotherhood's Mechanical Engineering Works, Messrs. Maudslay, Sons & Field's Engineering Works, Sir Henry Doulton & Co.'s Pottery Works, Lambeth Palace, dinner in Albert Memorial Hall, given by members of the Institution of Civil Engineers, and drive through Windsor Great Park to Virginia Water; private entertainments given by Mr. S. B. Bulson, Assoc. Inst. C. E.—performance of "Midsummer Nights Dream;" reception by the Right Hon. Lord Brassey, K. C. B. Assoc. Inst. C. E., Garden Party by Baroness Burdett-Coutts, Works of the Chelsea, East London, Grand Junction, Lambeth, Southwark and Vauxhall and West Middlesex Water Companies; Hampton Court Palace, Bushey Park, Sewage Disposal Works, Wimbledon, Engine Works of Messrs. Williams & Robinson, Goods warehouses of the London & Northwestern, at Camden and at Broad street. Warehouses of the Midland, at St. Pancras and at Whitecross street; the City of London and Southwark Iron Tunneling Works, London Electric Supply Corporation Works, and many public and private buildings, together with the public parks and the Royal Botanic Society's flower show by special invitation. The Whitehall Club elected the members of the American engineering societies as honorary members of their club during their stay in London. A large number of special invitations from private corporations were received, which could not be accepted by the engineers in a body, owing to the limited time allowed in London. The London, Chatham & Dover Railway Co. furnished a special train and boat for the free transportation of the party from London to Calais. From Calais to Paris the Northern Railway of France furnished a special train for the free transportation of the party to Paris, stopping at Arques to enable the members to visit the hydraulic lifts of Fontinettes. On arrival in Paris the party was granted one day for a rest and attendance to private matters, after which there was a general meeting in the parlor of the "Société des Ingénieurs Civils," in the machinery hall of the exhibition, ascent of the Eiffel Tower and lunch in the tower with Monsieur G. Eiffel, visit to the various parts of the exhibition in seven groups, covering all the engineering exhibits, the churches of Paris, the sewers of Paris, National Tapestry Works, Pasteur Institute, Astronomical Observatory at Paris, National School of Mines, public conveyance headquarters, omnibuses, trams and cabs; depots, Boulevard Bourdon, Rue Championnet Works, drive through the city sewage works, pumping stations and sewage farms, Historical Museum, Conservatoire des Arts et Métiers, Hotel des Invalides, Botanical and Zoological Garden, City Hall, Musée des Thermes, Hotel de Cluny, National Library, Manufacture Nationale de Sèvres (China), Versailles, Louvre, Luxembourg, reception in the Gas Pavilion at the Exposition, reception at the City Hall by a delegation from the city authorities, the Popp Compressed Air System, reception by Monsieur Popp, the locomotive and railroad shops of Monsieur Decauville, with reception by M. Decauville. After disbandment in Paris a portion of the party visited Germany and were entertained by German engineers in the vicinity of Düsseldorf in a most sumptuous manner. The entertainment included a visit to various shops, and an excursion on the Rhine, during which the banks were illuminated with colored lights and fireworks. The party had been furnished with free transportation from Paris to London and from London to Liverpool by the London & Northwestern, the London, Chatham & Dover,

and the Northern of France. The Midland had also offered transportation in England to those who desired to visit portions reached by its lines. This list of entertainments is necessarily incomplete, owing to many more private entertainments which are given to portions of the party at different times. The joint executive committee of the American engineering societies gave Mr. Henry R. Towne a dinner in Paris, in a precision of the able manner in which he represented the American engineers at the various receptions, and assisted in carrying forward the arrangements of the excursions. It is expected that parties of both French and English engineers will visit the United States at no distant date, and it will puzzle the American engineers to offer to such guests an entertainment equivalent to the one they have just received. There will, of course, be no lack of hospitable feeling or funds to complete arrangements, but it will be impossible to exhibit in the same time, and with so little travel, the same number of attractions. Whatever may have been the plans of the individual members of the party before leaving this country, it is safe to say that most of them were compelled to change their intended course and follow the leadership of the hosts, because of the superior advantages to be obtained thereby and while much that was planned by individuals had to be omitted by them, yet in the place thereof was substituted attractions and special exhibits that more than recompensed for the omission, and besides this they were of that character which may never again be offered during the lifetime of the visitors. Therefore, from all standpoints, the tour which, as far as the formal body of engineers is concerned, is now at an end, has been a most gratifying success.

The Combustion of Bituminous Coal Without Smoke.

The appearance of a sensational statement that the Board of Health of New York City had ordered the New York Central & Hudson River road to use anthracite coal in all switching engines and for all passenger and freight locomotives operated below One Hundred and Twenty-fifth street, which order, if carried into effect, would have necessitated the establishment of a new terminal station near One Hundred and Twenty-fifth street, or a complete change of all the locomotive fire-boxes and draught arrangements, has induced us to obtain a statement of facts from General Superintendent Toucey, together with some account of the means employed by the company to mitigate the smoke nuisance as much as possible.

Bituminous coal is used on all the locomotives operated by the New York Central. The grade of coal employed is known as Pardee coal from the Phillipsburg region, a good quality of fuel, containing considerable volatile matter, making little clunker, and burning to a fine ash. All the passenger locomotives of the company, and many of the freight engines, are fitted with the Buchanan divided fire-box, an illustration of which was published in the *Railroad Gazette* for April 20, 1877. The same appliance is being placed in the remaining freight locomotives. The switching engines have the ordinary square fire-box. The Buchanan fire box, briefly explained, has an inclined water table, dividing the furnace into two parts, a hole in this water table affording passage for the products of combustion to the tubes. Steam jets with air orifices, at the front and back of the fire-box, admit superheated steam of boiler pressure above the fire, and draw in air; the steam issuing from the jets striking against conical deflectors. The jets are arranged in two horizontal rows, at the front and back of the fire-box, respectively, the row at the front being on a lower level than the back row. The action of these jets causes a mechanical mixture of the air and unconsumed gases, completing the combustion, with careful firing, in the lower half of the divided fire-box, so that only consumed gases issue through the hole in the water table, into the upper half of the fire-box and pass thence to the tubes. Mr. Wm. Buchanan, the Superintendent of Motive Power, states that this fire-box, with proper management, and with the grade of coal habitually burned, effectually prevents the formation of black smoke. This fact being determined, the company has taken effective measures to secure proper firing. Simple rules for the direction of firemen are issued in printed form, to the effect that the coal is to be kept wet; that after firing, the furnace door is to be left slightly open until the volatile matters are consumed, regulating the closing of the door by watching the stack; and it is added that, "if black smoke escapes, it is a sure indication that the door is closed too soon after firing." In order to carry out these rules a system of inspection is maintained; and if smoke is seen to issue from the stack of a passenger locomotive, the engineer and firemen are immediately suspended, their names being posted on the bulletin-board with the statement: "Suspended for smoking," which action, it is stated, tends to make the firemen very careful.

During the recent disastrous freshets in Pennsylvania the company was unable to obtain its usual supply of Pardee coal, and was obliged to employ Cleveland gas coal, a fuel very rich in volatile matter, and which could not be burned in the Buchanan fire-box without emitting considerable volumes of black smoke. This fact is only another proof of what is perhaps well known by experienced railroad men, that no ordinary form of fire-box is suitable for the smokeless consumption of all varieties of coal, but that the design must be varied to suit the conditions of each special case.

A single resident along the line above the Grand Central depot complained of this smoke to the Board of Health, and the Board requested the railroad company to substitute anthracite for bituminous coal below 125th street. As soon as the usual supply of coal was again obtained, inspectors of the Health Board were asked to ride upon locomotives of the

company, making their own observations; and after having done so, they expressed themselves as perfectly satisfied with the present mode of operation. The switching engines, with the ordinary fire-box, and doing very hard work, emit considerable black smoke, and the Board of Health has asked the company to use coke for these locomotives. This the company has agreed to do. The change may possibly involve some additional expense, but in any event it will probably be trifling. The Pardee coal, delivered at the receiving stations, Lyons and Buffalo, costs the company \$3 per ton, and it must be transported to New York for use in the switching engines. Coke, delivered ready for use, costs \$3.50 per ton, and will probably give a somewhat greater evaporative efficiency than the bituminous coal. Anthracite coal, which is used for some purposes by the company, costs about \$4.50 per ton.

This statement of the general arrangements for firing on the New York Central may be supplemented by the remark that the standard locomotives have the extended front, with wire netting and an adjustable deflecting-plate, and that a single nozzle exhaust is used.

Prorating between New York and St. Paul.

The roads east of Chicago refuse to join with the roads to the northwest in prorating between St. Paul or Minneapolis and the seaboard. No doubt this will be a disappointment to the Chicago-St. Paul people, but the refusal has strong grounds to support it. The Central Traffic Association people call attention to the fact that they do not make so low a rate to Chicago from Pittsburgh as they do from Fort Wayne, nor from Cleveland as from Ekhnart, nor from Detroit as from Michigan Central way stations, although the traffic from all these prominent cities is larger than from the smaller points named. The short-haul law is practically observed in the trunk line territory, where distance and geographical considerations are the ruling features in the matter of proportionate tariff making. The proposition was to make substantially the same rates between New York and St. Paul as between New York and Chicago, being 75 cents, first class, and so on. Of this the Eastern lines were to get 60 per cent., or 45 cents, as a proportion to Chicago on St. Paul traffic. The Eastern and central roads regard this disproportion between 75 cents and 45 cents as inequitable, and hint that the same reasons which led them to refuse to grant lower proportionate rates to the large and competitive towns than to the smaller places along the lines are just as applicable to the territory between Chicago and St. Paul. They virtually say that they are committed to the short-haul distance theory in their own territory, and, therefore, cannot logically be a party to making lower proportionate rates from Chicago to St. Paul than from Chicago to La Crosse or Winona.

This phase of the subject has been somewhat overlooked. It has been too much the fashion to talk of preserving the local business by establishing a prorate to and from large cities far apart, while charging a much higher proportionate rate on the local traffic. This must, in the end, prove to be a mistaken policy. While seemingly easy in position, the local industries are really competing with those at the terminal points as certainly as though they stood side by side. To attempt to get more from the product of these local mills and factories than from the products of the competing points would simply result in driving these local industries away to the large cities, and thus the road which formerly controlled the shipments of supplies in and products out would find itself getting but a limited share of the now competitive traffic. Now, when we are awakening to the value of local traffic more than ever, any tariffs which seriously hamper it should be considered with great caution.

There is a feeling among certain eastern railroad men that it is only a question of time when the whole local and through rates in the northwest must be readjusted to the basis of Lake Superior and northern competition. If this be true, they think the remedy is not to involve themselves (trunk lines) and their revenues in a hopeless fight, but to induce the northern lines to put their through rates as high as the circumstances will admit. Rather a barren remedy, it may be thought, but perhaps the best now possible.

In the development of steam navigation, the change from single expansion to double, triple and quadruple expansion engines, is scarcely more important than the abandonment of the paddle-wheel for the screw propeller. The year 1869 may be said to have marked the practical completion of this change; and in an interesting discussion about steamship propulsion, by the Société des Ingénieurs Civils, some interesting data were presented. The "Washington," a large paddle steamer, had an average speed of 10 knots, and burned 96 tons of coal in 24 hours. When changed into a twin-screw steamer—the old boilers being retained—the speed was increased to 11.8 knots, with a daily coal consumption of 83 tons; and at the time of this discussion, in 1869, the "Napoleon III," the last of the paddle steamers belonging to the Compagnie Générale Transatlantique, was in process of conversion to a screw vessel, with a guarantee on the part of the firm making the change, that the speed should be increased from 10.58 to 12 knots per hour, and the daily coal consumption reduced from 115 to 70 tons.

Of late years the screw has displaced the paddle-wheel in many instances for vessels navigating rivers and lakes, and the tendency to make this change seems ever on the increase. The weight of testimony as to the advantage of the screw over the side-wheel in every respect, except that of draft, is so overwhelming as to justify the belief that the side-wheel is fast passing away.

The desirability of screw propulsion for ferryboats is

obvious, both on account of the increased carrying capacity thereby attained, and the facility with which vessels propelled by screws can pass through the surface obstructions caused by ice. While these advantages have been generally recognized, many conservative builders and designers have believed that it was impracticable to make the change, fearing that a screw vessel could not be managed with the same ease as obtains with side-wheel steamers. These theoretical objections have been disproved by experiment, several screw ferryboats being now in successful use. The present number of the *Railroad Gazette* illustrates an example of this new type of ferryboat, which has now been running for a sufficient length of time to thoroughly demonstrate its advantages, and to give reason for the belief that the old style of paddle-wheel ferryboats will ere long be abandoned. Whether the single screw or twin screw system will be most desirable in ferryboat practice is yet to be determined. In ocean steamships the twin screw is found to possess many advantages, lessening the draught and offering a safeguard against complete disabling of the machinery. With two independent sets of propelling machinery, the chances against disabling accidents are doubled; and it is found in practice that a twin screw steamer can make about three-fourths as much speed with a single screw as can be attained when both are in use.

The almost continuous rainfall of the last fortnight has told severely upon the transportation companies which cater to the wants of excursionists. In the vicinity of New York city excursion trains and boats have, in some instances, been run regularly on schedule time, independently of the amount of patronage; but several of the excursion boats have been run in a manner which can only be characterized as capricious (not to use a harsher term), thereby seriously inconveniencing many would-be passengers. A few lines advertise that boats will not be run on inclement days, but this practice is not generally followed; so that the only means of discovering that a boat is temporarily withdrawn is to visit the wharf. There is a serious lack of business equity in this neglect, and steamship companies would gain favor with the public by changing their course and giving public notice of the discontinuance of trips. An experienced retail merchant, who has made great wealth in a local business where the largest single trade probably never exceeds \$5, lately said that his success was due to the fact that he pleased his customers, and he added that he had a continual fight with his clerks to make them carry out his principles. You can never fool a customer the second time, said this millionaire. Railroad officers, unfortunately, can point to countless cases in their line of business in which the public has been fooled, and the perpetrator of the trick has apparently suffered no diminution in his prosperity. Railroad, and steamboating as well, has so largely enjoyed the advantages of monopoly that bad habits of this kind have had a luxurious growth in many quarters. The fight to enforce an appreciation of correct principles in dealing with the public has had to be waged not only with the "clerks" but in higher circles, as well.

The Official Classification No. 6, taking effect Aug. 15, has been printed. The changes are quite numerous, but are mostly in the minor articles. The most important we notice is the re-arrangement of the classification of artistic glass as compared with common window glass and the change in liquors. It will be remembered that glass, stained, decorated, colored, enameled, ground or figured, was formerly in first class. This is now divided, and glass, decorated or etched, is kept at first class, while colored or ground is same as window glass. Rolled cathedral glass, not framed or leaded, is put in third class. Liquors in wood have always been put in third class for small lots when under a valuation of \$20 per barrel. This valuation clause has been stricken out and small lots put in second class without any requirement except O. R. The minor changes spoken of show the hard and painstaking work of the Committee, its Chairman, Mr. C. E. Gill and Secretary, Mr. R. G. Stevenson, whose names appear now for the first time upon the title page. We miss the familiar name of Albert Fink, whose space is taken by Chairman H. J. Hayden. Some of the rules are altered a little. One is: "Agents at destination will not distribute carload property among two or more consignees," but how they are to act when orders to deliver certain goods to certain teamsters are presented, is not explained. A very good definition of rough, white and finished is given. "In the rough" means sawed or hewn, but before manufacturing has begun; "in the white" means before an article has been painted or varnished, but may include one coat of priming; "finished" is the manufactured article.

The plan of the metropolitan railroad in Paris has been at last definitely settled. The contest between the partisans of underground and elevated railroad has finally resulted in a compromise favoring the former. The belt railroad is to be eleven kilometres in total length, of which two-thirds are to be underground and one-third elevated. Starting from the Madeleine, the line runs northeast past the Opera, thence to the stations of Vincennes and Lyons, crosses the Seine to the Orleans station, and thence returns to its starting point. Besides this main line, there are to be two branch lines, running to the Northern stations and to the Central Market. The main line is to be run by an independent company, with \$5,000,000 of capital stock and \$6,000,000 of bonds—a total capitalization of about \$11,600,000 a mile. The branches are to be constructed and operated by the Northern Railroad.

The American engineers visiting the Eiffel Tower were presented with a plan of the surrounding country as seen from

the top of the tower. The plan is about 28 in. in diameter, and covers a circular area of about 80 miles radius. The country beyond this radius is wholly invisible. This map shows the value of the tower in case of war. It was expected that the structure would be useful for strategical, meteorological and astronomical observations, for the determination of the value of electric lighting at great elevations, and for scientific experiments, among which may be mentioned the velocity of bodies falling through the air, resistance of the air at different velocities, the oscillations of the pendulum and the vibration of structures. Experiments will probably commence soon after the closing of the exhibition. The number of visitors to the tower is quite as great as expected. Much of the time large crowds are awaiting an opportunity to ascend.

NEW PUBLICATIONS.

A Manual of Instruction for the Economical Management of Locomotives; for Locomotive Engineers and Firemen. By George H. Baker. Chicago, 1889. 16mo. 122 pp.

This little treatise gives in simple language the elementary principles relating to fuel, combustion, heat and steam. After an explanation of the means to be employed for obtaining economical results, definite rules of management for engineers and firemen are added. To summarize briefly, the fireman is recommended to use coal of the proper size, and to build up his fire at times when the demand for steam is slight. The engineer should have a reserve on starting or before arriving at a heavy grade, by carrying the water-level as high as practicable; and in running, he should open the throttle-valve wide, regulating the effective pressure by the link. Steam should never be blown off into the air, if it can possibly be avoided. Surplus steam can be discharged into the tank up to certain limits, and a table is given showing the admissible temperature of feed-water, as determined by experiments with various types of injectors. A few points in this admirable treatise seem open to criticism. For example, the statement on page 31 that oxygen is a fuel, and on page 58 that water has a greater specific heat than any other substance. But on the whole, it may be said that the work is one which can be thoroughly recommended, and which will be very useful to the class for which it is intended.

Foreign Railroad Notes.

The Austrian Society of Engineers and Architects recently devoted several sessions to the discussion of the relative merits of Bessemer, Thomas and Martin steel for rails. The result was summed up by the President of the Society, Court Councillor Bischoff, who is Chief Engineer for construction of the state railroads, as follows: Thomas steel appears to be equally as good as Bessemer steel for rails; but it is probable that the rails of the future will be of Martin steel.

The South Russian Agricultural Co., of Odessa, in order to promote grain exports, purposes to construct elevators at the chief grain markets, and especially in Odessa, Nicolajeff, Sebastopol, Cherson, Kertsch, Akkerman and Berdiansk, and at various interior points.

Greece has now 367 miles of railroad, all but 6 miles built within a few years past. The longest line extends from Athens to the Peloponnesus, 190 miles. There are also 207 miles under construction. All the lines except the 6 miles of old road from Athens to the Piræus are of narrow gauge; but a standard gauge line is projected from Athens to the border, 250 miles, to connect through Turkey with the European railroad system.

In France recently the holder of a season ticket which entitled him to ride daily between certain places, with the usual allowance of baggage, handed in as baggage a package and sent the receipt, which is equivalent to the American check (except that you pay two cents for it), to his father and did not make the journey himself. The railroad company regarded this as an attempt to defraud, and prosecuted the holder of the season ticket. On behalf of the latter it was argued that as he certainly had the right to have himself and the package carried, the company could not complain because he required only the carriage of the package; and he pretended that he really intended to go by the train, but was engaged in conversation with a friend until it was too late. The company showed that the "baggage" was a package of coffee, and held that it was evidently an attempt to get it carried for the two sous charged for registering baggage instead of the regular rates charged for carrying express freight. The court found in favor of the company and fined the ticket-holder.

The French railroads put vine trimmings—a not unimportant article of commerce in countries poor in fuel, like France and Italy—in the third class of freight, and living plants in the first class. Of late years the destruction of the old vineyards by the phylloxera has led to the reconstitution of vast areas of vineyards with vines of American stock, which are not much injured by the phylloxera, and consequently there are many shipments of American vine cuttings, which (perhaps some may not know) take root when planted in the ground. The railroads have been charging first-class rates for these cuttings. Being planted and forming vines, they must be living plants, they said. But the vinegrowers said they were nothing but vine trimmings, "särments," because they had no roots. Recently one of them brought the matter before the courts by shipping some cuttings, tendering the third-class rate and refusing to pay any more. The railroad company sued to recover the first-class rate. It was

beaten in the first court and on appeal, and so vine cuttings are judicially declared not to be living plants in France.

The Northern Railroad of France is now making renewals with steel rails, weighing 85 lbs. per yard, in place of the old pattern, weighing 60½ lbs. The latter were designed to endure as a maximum the pressure exerted by a Crampton locomotive weighing 105,500 lbs., with 27,500 lbs. on one axle, running 62 miles per hour, considered equivalent to a load of 7,700 lbs. per metre. The present locomotives, however, have a total weight of 170,500 lbs., and 31,350 lbs. on one axle, equivalent to a load of 10,613 lbs. per metre, and some of the cars have a load of 14,520 lbs. per axle.

The standard length of the new rail is to be 12 metres (39 ft. 4½ in.). The number of ties per rail is reported to vary according to the speed of trains, from 12 where a speed of 50 miles an hour is the maximum permitted, 13 thence up to 59 miles an hour, and 14 ties per rail for greater speed, the latter being 2 ft. 10 in. from centre to centre.

The mechanical engineering works of Mr. Peter Brotherhood, Belvedere Road, Lambeth (England), are small, but well lighted and completely filled with machinery. Few shops can boast of so much machinery per square foot of floor as is obtained in this shop. The tools are quite new, and many of them are of special design. Most of the work consists in the manufacture of the well known Brotherhood type of stationary engine used in this country for the propulsion of dynamos for electric lighting in railroad trains. However, not a few air compressors for torpedoes for the British Government are also made here. Owing to the minimum of weight per horse power developed by these engines, when constructed on the lightest plan, they have been extensively used for torpedoes, and in this alone Mr. Brotherhood has a good business. A peculiar fan, driven directly by one of these engines, for blowing the fires of marine boilers, can be seen at the works.

Messrs. Williams & Robinson, engine builders, at Thames Ditton, London (England), have brought out a new stationary engine, suitable for driving dynamos direct. It is constructed with a view of a minimum steam consumption per horse power, and tests made by Professor Kennedy show that engines of small size will generate one horse power with a consumption of only 19 lbs. of steam.

The *Journal* of the German Railroad Union gives a list of these parts of the Prussian state railroads which had the heaviest freight traffic in 1888:

Distance miles.	No. freight cars.	Greatest No. dis- patches per day in one direction.
Berge-Borbeck to Frintop.....	2.9	3
Frintop to Oberhausen.....	2.8	4
Gleiwitz to Laband.....	3.6	2
Laband to Kassel.....	19.3	42
Oppeln to Breslau.....	50.7	38
Hochfeld to Oppum.....	8.1	30
Saarbrücken to Neunkirchen.....	13.5	34
Herdecke to Witten.....	7.9	36
Holzwickede to Unna.....	4.3	28
Soest to Altenbecken.....	13.4	25
Hamm to Minden.....	70.0	22
Wunstorf to Hainholz.....	11.1	28

The number of cars is practically one-half the number of axles, very few German freight cars having more than two axles, and the load is 11,000 lbs. per axle. The average number of cars per train, then, varied on these sections from 34 to 61, aside from the eight-mile stretch from Hochfeld to Oppum, where the figures printed in the table would indicate an average of 127 cars per train, which is so very much in excess of the others that we suspect a typographical error in the number of car axles.

A comparison of these figures with the freight movement on some of the more frequented American lines would be of interest. If we remember rightly, on parts of the Erie and on the Chicago, Burlington & Quincy, between Chicago and Aurora, while they were still single track lines, the number of trains exceeded some of the above.

TECHNICAL.

Locomotive Building.

The Missouri, Kansas & Texas has received the first of 15 new locomotives recently ordered from the Baldwin Locomotive Works.

The Ohio Valley road last week let the contracts for five new engines and a number of new passenger coaches.

The Rogers Locomotive Works have an order for building three locomotives for the San Francisco & North Pacific for freight and passenger service. The cylinders will be 17 x 24 in.

The Lake Erie & Western last week received three new Mogul engines from the Brooks Locomotive Works.

Three new eight-wheel connected engines, with cylinders 21 x 26, have recently been completed at the New York Locomotive Works, for the Rome, Watertown & Ogdensburg road.

Five new engines have been ordered for the Columbus Southern from the Rhode Island Locomotive Works, and two will be delivered very soon.

Car Notes.

The Nashville, Chattanooga & St. Louis has recently received three new passenger cars from the Ohio Falls Car Works, and is having two more built at the Pullman Works. The cars are handsomely finished in mahogany and red wood, and will be used on the Nashville and Chattanooga Division.

Two trains have been built consisting of one combination baggage and smoking car, two coaches and two drawing-room cars—ten in all. The coaches and combination cars are to be the property of the "Shore Line," made up of the Old Colony, New York, Providence & Boston and New

York, New Haven & Hartford. The drawing-room cars are owned by the "Wagner Shore Line Co." and the railroad companies jointly.

The San Francisco and North Pacific will soon place an order for 25 box cars and 50 platform cars. These cars may be built at Tiburon, Cal., opposite San Francisco, where the company recently had 50 box and platform cars built.

The Alabama Great Southern recently placed an order for ten new cars, baggage, mail, express and passenger coaches, with the Ohio Falls Car Co., of Jeffersonville, Ind., and the cars are now being received. The Ohio & Mississippi is having seven United States mail cars, 62 ft. in length, and four coaches of mahogany finish on the interior, built at these works.

The Receivers of the Missouri, Kansas & Texas have awarded the contract for 500 coal cars to the Indianapolis Car & Manufacturing Co. The cars will be 33 ft. long, with a capacity of 50,000 lbs.

The Philadelphia & Reading has just received from the Pullman Palace Car Co.'s Works five new passenger coaches and five new combination smoking and baggage cars for use on the Atlantic City road. This addition makes a total of 50 handsome new passenger and combination coaches added to the equipment of the Atlantic City road since July 1.

The Kansas City Car & Wheel Works, started up this week after several months' idleness. The company has secured the contract for building 500 refrigerator cars for the First Brewhing Co., of Milwaukee, to be used on the Chicago, Milwaukee & St. Paul. This contract, with others obtained also will afford employment for 500 men for 12 months.

Of the 3,000 freight cars which the Pennsylvania is to add to its equipment this year, the larger portion will be let to outside companies, and among those which have secured contracts are the following: The Peninsular Car Co., Detroit, Mich.; the Milton Car Co., Milton, Pa.; Erie Car Works, Erie, Pa.; Pardee, Snyder & Co., Watsonstown, Pa.; Harrisburg Car Manufacturing Co., Harrisburg, Pa.; Carlisle Manufacturing Co., Carlisle, Pa., and M. Schall, York, Pa.

Bridge Notes.

The County Commissioners of Baltimore County, Md., will build an iron bridge with a 50-ft. span at McDonough Station over Gwynn's Falls.

Sealed proposals will be received by T. G. Taylor, Charlottesville, Va., until Aug. 13, for constructing and erecting a wrought-iron highway bridge over the Opegon Creek, one mile west of Middleway, W. Va.

The Supervisors will build an iron bridge 71 ft. long at Dean, Minn.

The County Commissioners will build a one-span iron bridge at Madelia, Minn.

Two iron bridges are to be built by the town authorities at Holmen, Wis. One will have a 75-ft. span and the other a 20-ft. span.

The South Side Bridge Co. has been chartered, with a capital of \$300,000, to build a bridge over the Monongahela from the foot of Ross street to South First Street, Pittsburgh, Pa. The stockholders are: J. H. Given, A. F. Kenting, A. M. Nepper and J. F. Steele, Pittsburgh; Joshua Rhodes, Allegheny, and J. A. McDewitt, Lancaster. The bridge is chartered in connection with a new cable road.

Proposals are wanted by the commissioners, until Nov. 6, for erecting an iron bridge over the Chattahoochee River, between Fulton and Cobb counties, Ala.

The government engineers have approved the plans for the Brush Creek and Monroe street, Zanesville, O., bridges over the Muskingum River, and the Commissioners of Muskingum County can now ask for proposals to build them.

A contract for building an iron bridge across Flat River, at Belding, Mich., has been let to the Massillon Bridge Co., of Massillon, O., for \$2,600.

The authorities of Lee County, Ky., will shortly ask for bids on a 150 ft. iron and steel bridge across Stuffle Creek, at Beattyville.

The Phoenix Bridge Co., of Phoenixville, Pa., has been awarded the contract for building a large iron bridge on the Alabama Midland at Montgomery, Ala. This company is now erecting the iron bridges of the Columbus Southern over Bull and Ussatoe creeks. The latter bridge has a span of 150 ft. The company also has the contract for the construction of the new iron bridge for the Nashville, Chattanooga & St. Louis road across Stone's River.

Plans and specifications of the pontoon railroad bridge across the Missouri River at Randolph Buft, Mo., made by Capt. Gustave Dyes of Liberty, Mo., have been approved by the War Department as well as by the River Commission, and construction will begin when the river reaches a normal height. The location of the bridge site is about one mile below the bridge of the Chicago, Milwaukee & St. Paul railroad.

The bids for the new bridge across the Acushnet River from New Bedford, Mass., to Fairhaven are as follows: Penn Bridge Works, Beaver Falls, Pa., superstructure, \$28,800; John Bertram, New Bedford, complete, \$62,550; Berlin Iron Bridge Co., Berlin, Conn., complete, \$61,303; Wrought Iron Bridge Co., bridge, less abutments and approaches, \$36,000; R. F. Hawkins, Springfield, superstructure, \$19,000; Brownell & Murkland, New Bedford, masonry and earth filling, \$21,600; Brownell & Murkland, New Bedford, complete, \$49,127; Riverside Bridge & Iron Works, Paterson, N. J., complete, \$63,500; Dean & Westbrook, New York, complete, \$60,000; J. E. Buddington, New Haven, Conn., complete, \$35,216; Groton Bridge Co., Groton, N. Y., complete, \$47,500; King Bridge Co., Cleveland, O., complete, \$53,000. The contracts have not been awarded.

Manufacturing and Business.

The Pond Machine Tool Co. has just received an order from the New York & New England for one of its well-known steel tire-turning lathes, for turning steel-tired wheels on their axles, which permits the use of a broad-faced tool, taking the entire tread of both wheels at one cut. This machine weighs about 23 tons and is already in use on the Boston & Albany, New York, New Haven & Hartford, New York Lake Erie & Western, Chicago, Rock Island & Pacific, Northern Pacific and other leading roads of the country. The company has also received an order from the New York & New England for an improved 79-in. driving wheel lathe, with double quaternary attachment.

The Durham Manufacturing Co. has recently received orders for the Durham car door from the Southern Car Works, the Ohio Falls Car Co. and the United States Rolling Stock Co., to be applied to 700 fruit cars which these companies are building for the East Tennessee, Virginia & Georgia. The Littlefield Car Co. has placed an order for equipment for 225 box cars for the Iowa Central and the New York Central & Hudson River for 275 box cars.

The Hotchkiss & Upson Co., of Cleveland, has sold its plant, machinery, tools and stock to the Upson Nut Co., who will assume and execute all unfilled orders and contracts.

The Upson Nut Co. has heretofore had a large ownership in the Hotchkiss & Upson Co., and now merges that company's business into its own.

The Westinghouse Machine Co. is now manufacturing single-acting compound engines down to 35 H. P., and is adding a line of patterns down to 3 H. P. The company is turning out over 3,000 H. P. per month, and is now running its works on double turn. The adaptation of the compound engine to small powers is illustrated on the dock of the Red Star Steamer Co., at New York, where a 45 H. P. engine exhausts into a Korting condenser, using salt water, and operates a storage battery plant. The company has recently added two additional sizes, 200 H. P. and 250 H. P., to the list of engines it makes, and already has orders for twelve of the 200 H. P. size and several for the 250 H. P. engine.

The machinery and tools of Hinkley's Locomotive Works, 439 Albany street, Boston, are now offered at private sale by H. H. Clarke & Co., Boston, Mass. All machinery not sold before Aug. 21 will be disposed of at auction on that date.

Nicholson & Waterman, Providence, R. I., have received an order from the Pennsylvania Company for broaching, facing and stay bolt threading machinery.

The Valley Pump Company, Easthampton, Mass., has applied its patented method of moving steam valves to horizontal pumps. This method does away with joints and links, which have a tendency to draw the rod from the horizontal line on which it should move.

At the directors' meeting of the Consolidated Car Heating Co., held at Albany recently, D. D. Sewall was elected General Manager; J. H. Sewall, Assistant General Manager, and J. F. M. Elroy, Mechanical Superintendent.

The Garrett-Appersch Co. has been organized at Little Rock, Ark., by J. R. Miller, J. A. Garrett and D. R. Apperson to manufacture car wheels under the Fowler and Garrett patents. The capital stock is \$50,000.

The Dunham Manufacturing Co. has purchased a controlling interest in the patent of the "Cloud Truss" double angle fish plate. The company has already had inquiries from several large roads to commence with.

The Wainwright Mfg. Co. of Massachusetts, Boston, has recently supplied the following plants with well known corrugated copper tube feed-water heaters, the orders amounting to 23,000 H. P.: The Bennett Mfg. Corporation, New Bedford, Mass., compound heater; L. Waterbury & Co., Brooklyn, N. Y., tubular heater; Nyack Electric Light Co., Nyack, N. J.; Duclap & Sons, Philadelphia, Pa.; Geo. Upson, Boston, Mass.; B. W. Payne & Sons, Elmira, N. Y.; L. Lincoln & Co., North Dighton, Mass. A large number of heaters, ranging from 25 to 100 H. P., have also been ordered. The demand for corrugated copper expansion joints has been very large. In special expansion joints the trade has been quite large. The Holly Mfg. Co., of Lockport, N. Y., and the Dean Steam Pump Co. are using these joints exclusively in their compound pumping engines.

The Intercolonial will receive tenders until Aug. 10 for the construction and erection of ten water-tanks, of 50,000 gallons capacity each. The points at which they are to be erected are, Hallow St. Pierre, St. Charles, Ste. Helene, River du Loup, Capusical, Mill Stream, Bathurst, Moncton and Fallow, in the Provinces of Quebec and New Brunswick.

The Northern Pacific & Manitoba has prepared plans and specifications for extensive building operations in the woods at Winnipeg, Man. A round-house of brick with stone foundation, 270 ft. in diameter and 720 ft. in circumference is to be built. Among the other buildings to be erected will be a car-repairing shop, 240 x 100 ft., solid brick with stone foundation, a black-mith shop 100 x 60 ft. and a two-story brick store building, 70 x 40 ft., with office attached. The work will be pushed through as rapidly as possible as soon as the contracts are awarded. Oil tanks, pumps, etc., are to be put up this fall.

The Canada Switch Manufacturing Company is applying for incorporation for the purpose of manufacturing railroad switches and appliances. The chief place of business will be in Montreal, and the capital stock will be \$50,000. The incorporators are K. W. Blackwell and Jas. Reid, of Montreal, and Chas. Scott, of Philadelphia.

Iron and Steel.

The Reliance Steel Casting Co., recently organized at Pittsburgh to engage in the manufacture of steel castings, is at present erecting a building 50 x 135 ft. in that city. The works will probably be put in operation during the latter part of this month. The company will start with a 30-pot crucible furnace. Charles Bailey, who was for some years Assistant Superintendent of the Pittsburgh Steel Casting Co., is chairman of the new company.

No. 3 Pioneer Furnace of the Pottsville Iron & Steel Co., at Pottsville, Pa., is being torn down with the intention of at once rebuilding it and doubling its capacity. No. 1 is the only one of the company's furnaces now at work, No. 2 being blown out. The building operations will last three months.

Sharon Furnace, formerly operated under lease by Spearman, Colford & Co., at Sharon, Pa., has been leased from the owners by Charles and Norman Hall, and will be put in blast during the present month.

The large blast furnace at Topton, Berks County, Pa., which was to have resumed this week, was unable to do so, and will have to remain idle for an indefinite time because of the scarcity of coke, caused by the strike in the Connellsville district.

Girard Furnace, at Girard, Ohio, is undergoing extensive repairs, which when completed will materially increase the capacity of the furnace. It is owned by A. M. Byers, of Pittsburgh.

The puddlers of Light's rolling mill, the Lebanon Iron Co. and the West End Rolling Mill, at Lebanon, Pa., have notified their employers that an increase of 35 cents per ton would be expected after Aug. 10. The present rate is \$3.50 per ton. Several months ago the puddlers' wages were increased 25 cents. The firms have taken no action on the new demand. Over 500 hands are employed in these mills.

P. L. Kimberly & Co., Limited, of Sharon, Pa., are making some extensive improvements at their Etna Furnace, at New Castle, Pa. Three large Whitwell stoves are being erected, to take the place of the present hot-blast system. A new battery of three steam boilers is also about completed, and other improvements are being made that will cost about \$50,000 altogether. J. P. Witherow, of Pittsburgh, has charge of the work.

The Secretary of War has awarded the contract for furnishing castings and forgings for a 10 in. rifle to the Standard Steel Casting Co., of Thurlow, Pa., at 27 cents per lb.

The bidders for furnishing the army with forgings for three hoops and parts of breech mechanism for a 10-in. steel wire gun were the Midvale Steel Works, Philadelphia, 98 cents per lb., delivered in 150 days, and the Bethlehem Iron Co., of South Bethlehem, Pa., 40 cents per lb. for certain of these forgings, and \$1 per lb. for the breech mechanism forgings. The latter bid was accepted.

A Water Railroad.

An account is published of the exhibition at Paris of a so-called "Chemin de Fer Glissant," or "Slide Railroad," on the Esplanade des Invalides within the exhibition. The new invention, says the report, "is a singularly original contrivance for enabling trains to run, by means of water power, at a high speed. The train consisted of four carriages, affording room for about 100 passengers. The carriages had no wheels, being supported at the corners by blocks of iron of a size somewhat larger than a brick, which rested upon a double line of iron girders. In the middle of the line at regular intervals jutted out irregularly shaped pillars, the use of which was not yet apparent."

"Having taken our seats and the signal being given, we glided along very gently for the space of a few yards, when suddenly we gathered speed; two or three tugs were felt, and we were flying on at the pace of an ordinary train, but as smoothly as a boat on a river. There was a clicking noise on the rails, but this was due to a defect in the construction of the slides, and would be remedied. The absence of any vibration was wonderful. In a hydraulic train traveling at full speed—that is to say at the rate of 87 to 124 miles an hour—there would be almost no consciousness of motion. The journey down the length of the esplanade only occupied a few seconds."

"The sliding railroad was invented in 1868 by an engineer named Girard, who was killed in the Franco-German War, and it has been improved to its present state by one of his assistant engineers, M. Barré. The hydraulic carriages have no wheels, these being replaced by hollow slides fitting upon a flat and wide rail, and grooved on the inner surface. When it is desired to set the carriage in motion water is forced into the slide or skate of the carriage from a reservoir by compressed air, and, seeking to escape, it spreads over the under surface of the slide, which it raises for about a nail's thickness above the rail."

"The slides, thus resting not on the rails but on a film of water, are in a perfectly mobile condition; in fact, the pressure of the forefinger is sufficient to displace a carriage thus supported. The propelling force is supplied by the pillars which stand at regular intervals on the line between the rails. Running underneath every carriage is an iron rack, about 6 in. wide, fitted with paddles. Now, as the foremost carriage passes in front of the pillar a tap on the latter is opened automatically, and a stream of water at high pressure is directed on the paddles. This drives the train on, and by the time the last carriage has gone past the tap (which then closes) the foremost one is in front of the next tap, the water's action thus being continuous. The force developed is almost incredible. There is some splashing on the rails at the start, but this diminishes the faster the train goes. To stop the train the small stream of water that feeds the slides is turned off, and the latter coming in contact with the rails, the resulting friction stops the carriage very quickly."

"A water train running at over 100 miles an hour could, I was told, be stopped within 90 ft. The centre of gravity of the car is scarcely more than 2 ft. from the rails."

The Minnesota Car Company.

This company was organized in Du'utb, Minn., Aug. 29, 1888, and the works are now approaching completion, the company expecting to commence operations on Aug. 15. The works are designed for a capacity of 15 standard cars, or 18 flats and gondolas, per day. The company intends to roll all its own iron, and also furnish iron to the market. The general arrangement of work comprises the paint shop, 58 by 362 ft., with a capacity for 25 cars; the erecting shop, planing-mill and machine shop, 97 by 527 ft., one-half of the length being used as erecting and truck shop, with a capacity for 20 cars, the planing mill and machine shop being run by a Buckeye automatic engine of 300 horse power; the foundry and pattern shop, 61 by 385 ft., the foundry having a capacity of 100 wheels per day; the forge and rolling mill, 30 by 360 ft., with gas furnaces for heating; two steam hammers, 3,000 and 6,000 lbs. respectively, and two rolling mills, one having a 10 and the other a 20-in. train, the power being furnished by two Corliss engines of 250 and 500 horse power respectively; the boiler room and gas producers, there being 6 boilers, each of more than 100 horse power, supplied with fuel from the planing mill by a system of blowers and pipes, and 5 gas producers for the heating furnaces, and a 2-story brick building, used for offices. The works are situated at the head of St. Louis Bay, on navigable waters, and the company intends to erect extensive wharves along the water front. The shops are fitted with the most approved machinery for the various branches of work, with cranes and other appliances for the economical handling of material. When the works are in full operation, about 1,000 men will be employed. The principal officers of the company are as follows: President, John F. T. Anderson; Superintendent, George H. White; General Manager, William E. Tanner. Directors, J. F. T. Anderson, William E. Tanner, General Joseph B. Anderson, Francis F. Glasgow and M. B. Harrison.

The Weems Electric Railroad.

A dispatch from Baltimore, Aug. 7, states that the Electro-Automatic Transit Co., at Laurel, Md., proprietor of the Weems Electric System, described in the *Railroad Gazette* of June 28 last, page 435, has succeeded in propelling its car over a two-mile circular track at the rate of 120 miles an hour for 10 miles. It is stated that the company will build at once a five-mile circular track on Long Island to demonstrate the practicability of the electric passenger system, and also the automatic system. The latter, the one thus far used, is intended only for light packages, mail matter and newspapers.

Naphtha Fuel.

Consul Michel reports from St. Petersburg an ever-increasing use of naphtha dregs as fuel. Russian manufacturers and railroads are adopting it in place of wood and coal, and it is even utilized for domestic purposes, in stoves of special construction. It is about 35 per cent. cheaper than wood or coal, and it occupies less space in storage.—*Heraclith's*.

General Railroad News.**MEETINGS AND ANNOUNCEMENTS.****Dividends.**

Dividends on the capital stocks of railroad companies have been declared as follows:

New London Northern, quarterly 1¼ per cent. on the common stock, payable July 2.
Portland & Rochester, 3 per cent., payable July 15.
Portland & Dover, 3 per cent., payable July 1.
St. Paul & Northern Pacific, quarterly 1½ per cent., payable July 15.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:
Central New England & Western, special meeting, 115 Broadway, New York City, Aug. 30.
Housatonic, special meeting, Bridgeport, Conn., Aug. 13.
Ohio, Indiana & Western, annual meeting, Indianapolis, Ind., Sept. 11.

Ohio Southern, special meeting, Springfield, Ohio, Aug. 30.

St. Catharines & Niagara Central, special meeting, St. Catharines, Ont., Aug. 13.

Union Depot Railroad Co. of St. Louis, special meeting, St. Louis, Mo., Aug. 20.

Terminal Railroad Association of St. Louis, special meeting, St. Louis, Mo., Oct. 1.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *New England Roadmasters' Association* will hold its next meeting in Boston, Aug. 21.

The *Roadmasters' Association of America* will hold its seventh annual convention at Denver, Colo., Sept. 10.

The *Master Car and Locomotive Painters' Association* will hold its twentieth annual convention in Chicago Sept. 11. The headquarters are at the Tremont Hotel.

The *American Association of General Passenger and Ticket Agents* will hold its next semi-annual meeting in Atlanta, Ga., Sept. 17.

The *New England Railroad Club* meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August. The next meeting will be held Sept. 11.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Tift House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The *American Society of Civil Engineers* holds its regular meeting on the first and third Wednesday in each month at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in St. Louis on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the house of the Club, 1,122 Gerard street, Philadelphia.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at the Club rooms, No. 24 West Fourth street, Cincinnati, at 8 p. m., on the fourth Thursday of each month.

The *Engineers' Club of Kansas City* meets at Kansas City, Mo., on the first Monday in each month.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Club of Kansas* holds regular meetings on the first Wednesday in each month at Wichita, Kan.

Master Car and Locomotive Painters' Association.

Secretary Robert McKeon, of Kent, Ohio, has issued the notice of the twentieth annual convention of this Association, which will be held at Chicago, Sept. 11, at 10 o'clock a. m., and continue in daily session until the business is disposed of. The Tremont House (corner Lake and Dearborn streets) is the headquarters of the Association. The best rooms with baths and board are from \$2.50 to \$3 per day. A cordial invitation is extended to foremen car and locomotive painters throughout the states and Canada, to attend the convention, whether desiring to become active members or not.

The subjects for discussion are: How shall we paint the heating parts of locomotives, such as domes, steam chests, cylinders, etc., so as to insure against blistering, cracking and scaling, giving exact formulas for mixing and time required to finish complete. Jno. McMurry, Pittsburgh Locomotive and Car Works, Pittsburgh, Pa.; W. T. Hogan, Atchison, Toroka & Santa Fe, Topeka, Kan.; A. J. Horton, Lake Shore & Michigan Southern, Elkhart, Ind.

Standard formula for the inside finish of a first-class passenger coach. This to include filling, how mixed and applied, varnish "grade" of, number of coats and time between coats "rubbed or laid finish." Wm. O. Quest, Pittsburgh & Lake Erie, Pittsburgh, Pa.; J. W. Houser, Cumberland Valley, Chambersburg, Pa.; Jos. Murphy, Louisville & Nashville, Louisville, Ky.

What constitutes the best filling for engine driving-wheels and other rough castings, quick work being considered? Give exact formula. W. C. Fitch, Southern Pacific, Sacramento, Cal.; J. G. Keil, Chicago, Alton & St. Louis, Bloomington, Ill.; Jno. S. Atwater, Hinckley Locomotive Works, Boston, Mass.

Is it advisable to discard the use of rubbing varnish on the outside of passenger, baggage, express and mail cars and use finishing varnish only, and do we obtain as good results by the use of finishing varnish, applied 36 to 40 hours between coats, as was obtained by the old method, which required 4 or more days between coats? M. L. Sims, East Tenn., Va. & Georgia, Atlanta, Ga.; E. A. Cole, New York, Chicago & St. Louis, Chicago, Ill.; Robt. McKeon, New York, Penn. & Ohio, Kent, O.

How long should a properly painted locomotive run before being cleaned and revarnished? What grade of varnish gives the best results, a hard drying or an elastic finishing? A. J. Bishop, Cleveland, Cin., Chicago & St. Louis, Delaware, O.; J. C. Stout, Union Pacific, Kansas City, Kan.

The benefits that railway companies may derive, and a plea to superintendents of rolling stock and master mechanics to recognize and encourage the Master Car and Locomotive Painters' Association, by furnishing their foremen painters with passes and allowing them to attend the annual meetings. (Essay.) E. L. Fetting, New York & New England, Norwood, Mass.

Does a neatly striped and decorated passenger locomotive and train attract the eyes of the traveling public more than those painted very plain, and will the cleaning on the latter be done as effectually as on the former? H. W. Walton, New York, Providence & Boston, Valley Falls, R. I.; Wm. Lewis, Grand Trunk, London, Ont.

The Master Car Painters' formula for painting the outside of a passenger car, giving detail from priming to last coat of varnish. Method with and without rough stuff. Advisory Committee—M. L. Sims, Wm. O. Quest, A. J. Horton, A. S. Coleman, E. L. Fetting.

Queries.—1. Is it a credit or a detriment to an under coat of paint to have an eggshell gloss? 2. What is the best way to test japan before mixing into paint? 3. Should hard and soft woods be primed or treated alike to make a good lasting job? 4. What is the best one coat of paint that will hold rust back the longest? 5. What color will show up the best

on a locomotive after 8 or 10 months of service, ivory black, lamp black or Brunswick green? 6. What is the best and the quickest method for removing old cracked and scaly paint from engine driving-wheels, domes and other rough castings? 7. Which is the most economical way to use gold leaf, to use direct from the book or cut into strips to suit the stripes, letters, etc.? 8. Have we a chemical eradicator for iron rust?

New England Railroad Club.

Commencing Sept. 11 the New England Railroad Club will hold its meetings on the second Wednesday of the month at the United States Hotel, Beach street, Boston.

Western Society of Engineers.

A meeting was held July 10. The following were elected members: Andrew Onderdonk, Max J. L. Fowler, H. Russell Smith, H. A. Stoltenberg and A. Bertelot.

Messrs Cooley and E. C. Carter were appointed a committee to prepare a memorial of Mr. Robert G. Turknott, recently deceased.

A letter was read from Mr. Walter Katté relating his first connection with the Society, which dates from before the Chicago fire.

The next meeting will be held Sept. 4, and the following questions will be discussed: "Underground Electric Railroads as a System of Rapid Transit for the Older Portions of Chicago," and "Systems of Municipal Engineering in Very Large Cities." Mr. Liljencrantz will read a paper on "Compound Lumber."

PERSONAL.

—Mr. Emil Forder, civil engineer, in charge of the Denver Utah & Pacific survey from Longmont to Lyons, died Aug. 1, at Lyons, Col.

—Mr. H. W. Beecroft, Car Accountant for the Missouri, Kansas & Texas, having resigned his position, R. H. Weddle has been appointed to succeed him.

—Mr. Charles Hansel, late Resident Engineer of the Wabash, has been appointed Consulting Engineer of the Illinois State Railroad and Warehouse Commissioners.

—Mr. Arthur W. Street, for many years connected with the Michigan Central, has been appointed Assistant General Freight Agent of the Toledo, St. Louis & Kansas City.

—Mr. John Ridgway, one of the projectors of the Cincinnati, Hamilton & Indianapolis road, and for 20 years President of that company, died at Indianapolis, Ind., July 29, aged 69 years.

—Mr. James P. Montgomery, who was formerly connected with the Louisville & Nashville, but who has for some time been General Superintendent of the Ohio Valley Railroad, has resigned that position.

—Mr. George W. Cale, for many years past General Freight Agent of the St. Louis & San Francisco, has been promoted to the position of Freight Traffic Manager of that company. The office of General Freight Agent has been abolished.

—Mr. H. A. Kennedy, Chief Engineer of the Cleveland & Canton, has been appointed Master of Transportation in addition to his other duties, to succeed Mr. Samuel D. Mayer, who has resigned to become Division Superintendent on the Chesapeake & Ohio.

—Professor Alexander B. W. Kennedy, the well-known writer on mechanics, is giving up his college duties to attend to the urgent demands upon his time for engineering work. He has become an accepted authority on steam engineering and all metal structures.

—Mr. Charles Murray, for 15 years Superintendent of the Galena Division of the Chicago & Northwestern, died recently in Chicago, aged 56 years. In 1855 he became a freight clerk on the Galena & Chicago Union road and continued in service when it became part of the Chicago & Northwestern.

—Mr. S. H. Hardwick, for several years General Eastern Passenger Agent of the Virginia, Tennessee & Georgia Air Line, and recently Assistant General Passenger Agent of the Georgia Division of the East Tennessee, Virginia & Georgia, at Atlanta, has been promoted to be General Passenger Agent of the Georgia Pacific.

—Mr. Frank Ellmaker, who succeeds Mr. Alfred Walter as Superintendent of the Sunbury Division of the Philadelphia & Erie, and of the Shamokin Division of the Northern Central, has been Superintendent of the Belvidere Division of the United Railroads of New Jersey since January, 1886, and has been with the Pennsylvania since June, 1880. He was Assistant Engineer of the New York Division from March, 1883, to January, 1886.

—Mr. M. C. Kimberly, who became Assistant General Superintendent of Western Divisions of the Northern Pacific last February, on the death of Mr. N. D. Root, has been appointed General Superintendent of the entire road, to succeed Mr. C. R. Ansie, who recently became General Manager of the Wisconsin Central. Mr. Kimberly was Superintendent of the St. Paul Division of the Northern Pacific for six years before he became Assistant General Superintendent.

—Mr. John Thomas, who has been Superintendent of the Cleveland & Pittsburgh Division of the Pennsylvania since October, 1885, has been made General Agent, to succeed Mr. Reuben F. Smith, transferred. Mr. Thomas is 53 years old, and has been in the railroad service since 1852. From 1864 to 1882 he was connected with the Cleveland & Pittsburgh as Superintendent of Telegraph, Assistant Superintendent and Superintendent. In January, 1882, he became General Superintendent of the Chicago Division of the Baltimore & Ohio, and in April, 1883, he became General Superintendent of the Pennsylvania Co., excepting the Cleveland & Pittsburgh. In October, 1885, he returned to this road as Superintendent.

—Mr. L. F. Lorie, who succeeds Mr. Thomas as Superintendent, has been Engineer of Maintenance of Way on the Cleveland & Pittsburgh Division. Mr. W. H. Scriven has been appointed Engineer of Maintenance of Way to succeed him. He held a similar position on the Little Miami Division, but resigned Sept. 1, 1888, on account of poor health, and went to Mexico.

—Prof. Henry C. Adams has been appointed to superintend the compilation of statistics on transportation for the Eleventh Census, but he does not, by accepting that appointment, relinquish his position as Statistician to the Inter-state Commerce Commission. His duties in the Census Bureau will be purely directive.

Prof. Adams graduated at Iowa College, Grinnell, Ia., in 1874; took the degree of Ph.D. at Johns Hopkins University in 1878; studied afterward in Berlin University and at the Prussian Statistical Bureau. Upon returning to the United States he was selected as Lecturer on Political Economy in Cornell University and in Johns Hopkins University. When James B. Angell, President of the University of Michigan, was appointed Minister to China, Mr. Adams was asked to

take charge of his classes in Political Economy. From 1883 to 1887 he had full charge of the work on Economics in Cornell University and the University of Michigan, spending one-half of the year in each place. In 1887 he was elected Professor of Political Economy and Finance in the University of Michigan, with which institution he is still connected. He was formerly a writer for *Bradstreet's*, and at present is a contributor to the *Nation*, *Forum*, and other papers and magazines. He has published a volume on "Public Debts" (republished in England), a monograph, "Taxation in the United States, 1789, 1816," and one on "The State in Relation to Industrial Action;" the latter has been widely reviewed, especially in Italy and France. He was appointed Statistician to the Inter-state Commerce Commission in October last. Professor Adams says that his chief interest in the Census work offered to him lies in the fact that it affords a rare opportunity for bringing transportation statistics in the United States into a harmonious organization.

ELECTIONS AND APPOINTMENTS.

Alabama, Georgia & Florida.—G. Gunby Jordan, Henry R. Goetebius, Oscar S. Jordan, J. M. Murphy, Jr., N. N. Curtis, T. M. Foley and H. C. Bussey, all of Columbus, Ga., are the incorporators of the road.

American Midland.—T. B. Sergeant has been appointed General Superintendent with headquarters at Findlay, Ohio. Mr. Sergeant was formerly Assistant Superintendent on the Wabash and also on the Michigan Central.

Atchison, Topeka & Santa Fe.—H. G. Krake, who for some time has been General Agent of the road in Cincinnati, has been appointed General Western Passenger Agent with headquarters in Denver, vice P. J. Flynn, resigned.

Baltimore & Ohio.—Under the new plan or organization the title of D. F. Maroney, Manager Car Record Office, has been changed to Superintendent of Car Service. In addition to his duties in car accounting, he will have charge of the distribution of cars between divisions, and location and movement of through freight and live stock.

Chattanooga, Rome & Columbus.—Geo. Skinner has been appointed Superintendent, with headquarters at Chattanooga, Tenn.

Chesapeake & Ohio.—The following appointments have been made: H. R. Dill, Superintendent of the Richmond & James River division, at Richmond, Va., vice C. T. Dabney, resigned; M. B. Cutter, Superintendent of the Huntington division, at Hinton, W. Va., vice H. R. Dill, transferred; Samuel D. Mayer, Superintendent of the Peninsula division and terminals at Richmond and Newport News, with office at Richmond, vice M. B. Cutter, transferred.

Chicago, Burlington & Kansas City.—J. H. Palmer has been appointed Assistant General Passenger and Ticket Agent of this road and of the St. Louis, Keokuk & Northwestern, with headquarters at St. Louis.

Chicago & Northwestern.—E. E. Hughes has been appointed Assistant Superintendent of the Middle Iowa Division, vice H. C. Maubana, resigned.

Chicago, Rock Island & Pacific.—J. E. Olesby has been appointed General Agent of the freight department at Salt Lake, Utah, William Brown having resigned to accept the position of Assistant General Freight Agent of the Rio Grande Western.

Chicago, St. Paul & Kansas City.—S. O. Brooks has been appointed Division Freight Agent for this company, with headquarters in the Bank of Minnesota Building, St. Paul.

Cleveland & Canton.—H. A. Kennedy has been appointed Master of Transportation on the Cleveland, Canton & Southern to succeed S. D. Mayer, resigned.

Cleveland, Cincinnati, Chicago & St. Louis.—The following Assistant General Freight Agents have been appointed: A. S. White, in charge of traffic originating on the line East St. Louis to Indianapolis, inclusive, office at St. Louis; A. B. Hough, in charge of traffic originating on the line Indianapolis to Cleveland, Cleveland to Columbus and Springfield, all inclusive, office at Cleveland; L. R. Brockenbrough, in charge of traffic originating on the line and branches Cincinnati to Chicago, inclusive, but not including Springfield and Kankakee & Seneca road, office at Cincinnati. All the division freight offices are abolished.

A. M. Stewart, formerly Live Stock Agent of the "Bee Line," has been appointed General Live Stock Agent of this road.

Cleveland & Pittsburgh.—John Thomas, Superintendent of this division of the Pennsylvania lines, has been made General Agent, vice R.uben F. Smith, transferred. His office will be in Cleveland. L. F. Loree, Engineer of Maintenance of Way, has been made Superintendent, vice Mr. Thomas. W. M. Scriben has been appointed Engineer of Maintenance of Way to succeed L. F. Loree.

Colorado Midland.—Chas. S. Lee, General Passenger Agent, has been temporarily placed in charge of the Freight Department of this company.

Columbus, Hocking Valley & Toledo.—W. N. Cott, Treasurer, has been chosen a director, to succeed D. W. Caldwell, resigned.

Columbus Southern.—The following board of directors was recently elected: T. J. Pearce, Nelson Tift, S. A. Carter, J. P. Kyle, James A. Lewis, John Stephens, Cliff B. Grimes, T. E. Blanchard. The directors elected the following officers: T. J. Pearce, President; Nelson Tift, Vice-President; Cliff B. Grimes, Secretary and Treasurer; W. A. Little, Attorney.

East Tennessee, Virginia & Georgia.—This company having assumed control of the Tennessee & Ohio, the officers of the various departments of the company, including the Superintendent of the East Tennessee Division, have been placed in charge of their various departments upon the Tennessee & Ohio.

S. H. Hardwick having resigned as Assistant General Passenger Agent of the Georgia Division at Atlanta, Ga., he has been succeeded by C. M. Knight, lately General Western Passenger Agent at Little Rock.

Grand Rapids & Indiana.—F. S. Bowen has been appointed Assistant Roadmaster, with headquarters at Petoskey, Mich., vice J. H. K. Burgwin, assigned other duties.

Houston, Central Arkansas & Northern.—James B. Greene has been appointed Superintendent, with headquarters at Monroe, La.

Hudson & Kinderhook.—The following are the officers of this New York company: R. H. Huntington, President; John R. Pawling, Secretary, and Frank Walts, Treasurer, all of Watertown, N. Y.

Kansas City & Excelsior Springs.—The following officers have been elected: President, C. H. Hammett; Vice-President, B. F. Hammett; Secretary, A. D. Leech; Treasurer, L. E. Davison.

Laramie, North Park & Pacific.—The following were elected directors of the company at the recent annual meeting: Charles Francis Adams, F. Gordon Dexter, Edward F. Atkins, Frederick L. Ames, Oliver W. Mink and James G. Harris, of Boston, Edward Dickinson, Thomas L. Kimball and William H. Halcomb, of Omaha.

Marshall, Paris & Sabine Pass.—G. W. Toublo has been appointed Master Car Builder of this road, with headquarters at Marshall, Tex.

Maryland Central.—Samuel Rea has been elected Vice-President, with headquarters at Baltimore.

Missouri, Kansas & Texas.—The following changes and appointments have been made: J. W. Allen, Assistant General Freight Agent, has been given charge of the freight business originating on the line. His headquarters will be at Sedalia, Mo. C. Hale has been appointed Assistant General Freight Agent in charge of freight business originating beyond the line, with headquarters at Sedalia. J. A. Smith, who has been Acting Division Freight Agent at Dallas, Tex., has been appointed Division Freight Agent.

R. H. Weddle has been appointed Car Accountant, with office at Sedalia, Mo., to succeed H. W. Beecraft, resigned.

New York, Fort Wayne & Chicago.—Incorporated in Indiana by the following directors: John Lee, Mark L. Demotte, O. M. Packard, A. T. S. Chist, J. A. Funk, Hiram S. Biggs, E. L. Nearer, Allen Sellers, H. B. Wittenberger, John Holterman, Millard W. Simons, John K. Lawrence, H. B. Brown, D. E. Simons and Augustus Wood.

New York, Lake Erie & Western.—Charles E. Clough has been appointed General Baggage Agent, in addition to his duties as Division Passenger Agent at the Chambers street station, New York City. He succeeds J. J. Post, who resigned on account of continued ill health.

Northern Pacific.—M. C. Kimberly, now Assistant General Superintendent of Western Divisions, has been promoted to be General Superintendent of the entire road, with headquarters at St. Paul, Minn. He will have direct charge of operation and maintenance, reporting to the General Manager.

Omaha, Lincoln & Gulf.—The incorporators of this new Nebraska company are as follows: George L. Rhochs, Chicago; G. A. Wullop, J. L. De Bevoise, B. Silloway and M. P. O'Brien, of Omaha, Neb.

Pennsylvania.—Frank Ellmaker has been appointed Superintendent of the Sunbury Division of the Philadelphia & Erie Railroad and of the Shamokin Division of the Northern Central, to succeed Alfred Walker, resigned.

Pennsylvania Co.—William M. Gafton has been appointed Signal Engineer of the Pennsylvania lines west of Pittsburgh. His office will be in Pittsburgh. This office is a new one.

Pittsburgh & Mansfield.—Incorporated in Pennsylvania by Robert H. Brown, President; Robert Christy, James J. Brown, Mansfield B. Brown and Robert J. Hardy, all of Mansfield, Pa.; Thomas P. Roberts, Allegheny City, and Richard A. Roberts, Pittsburgh.

Quebec Central.—E. Berryman has been appointed engineer in this company, in charge of permanent way, with office in Sherbrooke, Quebec.

Rutland.—At the annual meeting of the stockholders of the company, held in Rutland, Vt., recently, the old board of directors was elected as follows: LeGrand B. Cannon, Frederic Billings, George H. Ball, James Roosevelt, John W. Stewart, Benjamin H. Bristow, William Wells, Horace G. Young, P. W. Clement.

St. Louis & San Francisco.—George W. Cale has been appointed Freight Traffic Manager of the road, with office in St. Louis. The office of General Freight Agent, heretofore held by Mr. Cale, is to be abolished.

St. Louis, Vandalia & Terre Haute.—F. S. Holmes has been appointed Commercial Agent of the company at Cincinnati, with headquarters in the Chamber of Commerce building.

San Juan & Southern.—This company has been organized in Colorado by Judge M. B. Gerry, Daniel Wood, E. L. Davis, T. B. Townsend and C. E. McConnell. Daniel Wood has been elected President of the company, T. B. Townsend, Vice-President, and C. E. McConnell, Treasurer.

Santa Fe & Southern.—Clarence Coleman has been appointed Chief Engineer of this road, with headquarters in Santa Fe, N. M.

Terminal Railroad Association of St. Louis.—The following officers have been elected: President, George J. Gould, New York; Vice-President, William Taussig, St. Louis; Treasurer, A. H. Calif, New York; Secretary, George C. Smith, St. Louis; Assistant Secretary, James Hanna, St. Louis. The directors are: George J. Gould, George C. Smith, D. S. H. Smith, William Taussig, C. G. Warner, James Hanna, L. H. H. Clark and A. H. Calif. Jay Gould holds the majority of the stock.

Toledo, St. Louis & Kansas City.—Arthur W. Street, formerly Assistant General Passenger Agent of Michigan Central, has been appointed Assistant General Freight Agent of above road with headquarters at St. Louis.

Wabash.—The following are the directors of the consolidated company: James F. Joy, Detroit; Ossian D. Ashley and Thomas H. Hubbard, New York; Edgar T. Welles, Hartford; George W. Smith, Abram H. Pence, Charles Henrotin, John Maynard Harlan, Chicago, and John W. Bunn, Springfield, Ill.

Western New York & Pennsylvania.—W. D. Huntington has been appointed Assistant Division Superintendent of the Clermont Branch with headquarters at Larabee, Pa.

Youghiogheny Connecting.—The following have incorporated this company in Pennsylvania: Richard B. Wood, Allegheny, Pa., president; Charles H. Read, Pittsburgh, Pa.; James S. Kuhn and S. J. McFarren, McKeesport, Pa., and A. B. Darragh, Allegheny City, Pa.

Youghiogheny Southern.—The following are the directors of this Pennsylvania company: H. C. Frick, President; Philip Keller, John Pontefract, W. F. McCook, G. B. Bosworth and M. M. Bosworth, all of Pittsburgh; W. C. McCausland, Allegheny City.

OLD AND NEW ROADS.

Alabama, Georgia & Florida.—The bill recently introduced in the Georgia Legislature to incorporate this company has become a law. It will extend from Columbus to a point in Decatur County, on the boundary line between Georgia and Florida. The capital stock is placed at \$1,000,000. The preliminary survey of the line has been completed to Quincy, Fla., from Columbus, and the estimates are now being made.

Alabama Midland.—Messrs. James M. Brown & Co., of New York, who are building the main line of this road, from Bainbridge, Ga., to Montgomery, Ala., have been given the contract of constructing the extension from Montgomery northwest, through Maplesville, to Tuscaloosa, Ala., a distance of about 65 miles.

Nearly two miles of track is being laid daily on the main line, and the road from Bainbridge to Ozark, Ala., will be finished by Aug. 15, when the force on this section will be added to that now working between Ozark and Troy. The Company has entered suits for damages and trespass against the Central Railroad & Banking Co., of Georgia, for \$150,000, for the original right of way from the Barbour county line to the corporate limits of the town of Ozark.

Astoria & South Coast.—The rails for the section of this road from Skipanon, W. T., to the Ocean Side House, 18 miles, will be delivered this week, and tracklaying is expected to be completed before Sept. 1. The location south of Ocean Side House is now being made by two parties, and when 10 miles has been located grading will commence. A drawbridge is to be built between Skipanon and Astoria. There will be about a mile of trestle work to build on the west side of the river and about 2,950 ft. on the east side.

Atchison, Topeka & Santa Fe.—The gross earnings, operating expenses (exclusive of taxes and rentals), and the net earnings of this road and its auxiliary lines, for the month of June, 1889, are given in the following table:

	Gross Earn.	Oper. Expen.	Net Earn.
Atchison, Topeka & Santa Fe and Leased Lines, including Chicago Line; St. Joseph; Chicago, Kansas & Western; New Mexico & Arizona, and Sonora roads.....	\$1,502,062	\$1,296,792	\$205,271
St. Louis, Kansas City & Colorado.....	5,609	5,536	73
Gulf, Colorado & Santa Fe.....	252,468	243,515	8,953
California Central.....	75,092	73,146	1,945
California Southern.....	52,491	47,503	4,988
Total.....	\$1,977,722	\$1,666,492	\$311,230
Roads jointly owned with other companies.....	116,477	119,594	def. 3,117
Atchison Company's one-half.....			
Grand Totals.....	\$2,094,199	\$1,786,086	\$308,113

COMPARATIVE STATEMENT, ALL LINES.

	Gross Earn.	Net Earn.	Mile-Gross Earn.	Per Mile.
June, 1889.....	\$2,094,199	\$308,112	7,112	\$294
June, 1888.....	2,039,300	385,987	6,456	316
Increase June, 1889.....	\$54,899		656	
Decrease ".....		\$77,875		\$22

Augusta, Tallahassee & Gulf.—R. P. McCormick & Co., of Kansas City, have the contract for building this road, and have a force of men now on the work. The line is to be built from Augusta, Ga., to Tallahassee, Fla., and from thence toward the Gulf of Mexico.

Bald Eagle Valley.—An agreement of consolidation and merger of the Bellefonte, Nittany & Lemont Railroad Co. with and into the Bald Eagle Valley Railroad Co. was filed with the Secretary of the Commonwealth at Harrisburg, Pa., Aug. 1. The name of the consolidated road is the "Bald Eagle Valley Railroad Co." It is part of the Pennsylvania system.

Baltimore & Eastern Shore.—Tracklaying is expected to commence on the section between the Chesapeake Bay and the Choptank River, 20 miles, in five weeks. The grading is now making rapid progress. The line is located from Salisbury, Md., to Chesapeake Bay, a distance of 55 miles. From this point steamers will be run across the bay, a distance of 11 miles, and connection will be made on the other side with the Annapolis & Baltimore Short line, which runs into the Baltimore & Ohio Station at Baltimore. Godeffroy & How, of Easton, Md., have taken the contract to build and equip the road, and they hope to have it in running order by Jan. 1. They are doing all the work themselves, except some of the grading, and of this they may let out about 20 miles. The company some time ago purchased the Wicomico & Pocomoke road, and is now operating it from Ocean City west to Salisbury, Md., 30 miles. When the western division is completed the company will have a line across the Maryland Peninsula from the Atlantic Ocean to Chesapeake Bay.

Birmingham, Sheffield & Tennessee River.—A party of engineers this week commenced a locating survey for the proposed southern extension from Jasper, Ala., the present terminus. The southern terminus of the extension has not yet been decided upon.

Briarfield, Blocton & Birmingham.—About 100 men are putting in the stone culverts and masonry approaches on the 33 miles of the road between Aldrich and Blocton, Ala. Over 1,000 hands are scattered about over the rest of the line between Briarfield and Blocton, grading and preparing the road-bed for tracklaying, which will commence immediately.

Brighthope.—This road, which extends from Eppes Falls to Bermuda Hundred, Va., 32 miles, was sold at foreclosure recently, and was purchased for \$200,000 by the Farmville & Powhatan, as was anticipated in these columns some time ago.

Bristol & Elizabethton.—At a recent election held in Elizabethton, Tenn., this company was voted \$10,000 to aid in building its proposed road from Bristol south to Elizabethton.

Buena Vista.—Incorporated in New Jersey to build a road one mile long, from a point on the New Jersey Southern road to the village of Buena Vista.

Buffalo, Rochester & Pittsburgh.—The Lincoln Park & Charlotte branch of this road is now completed and open for freight traffic. Passenger trains will be put on as soon as the road has been ballasted.

Burlington & Missouri River.—On the extension northwest from Alliance, Neb., track has been laid for 30 miles, to a point two miles beyond Hemingford.

Cape Girardeau Southwestern.—The company is reported to have agreed to extend its line north about 40 miles to Perryville, Mo., if free right of way is given and a subsidy of \$25,000 is raised.

Central New England & Western.—This road has been running to all freight trains for some time, but last week through passenger and freight trains were put on the entire road from Hartford to and across the Poughkeepsie Bridge and to Campbell Hall, N. Y., 145 miles.

Centreville, Moravia & Albion.—This short Iowa road, from Relay to Albion, 24 miles, has for some weeks been abandoned, and the Railroad Commissioners have been trying to find the legal owner of the property to enforce an order for its operation, but for some time their efforts were

fruitless. Last week they received a letter from Russell Sage, stating that he and another had bought the road for the bondholders and leased it to the Keokuk & Western, but finding it did not pay they surrendered. He further states that they have made a contract with the Iowa Central, and regular trains will be run this week.

Columbus Southern.—The stockholders met in Columbus, Ga., July 31, and approved the proposition to mortgage the road to secure an issue of bonds. The road will soon be completed, tracklaying being now in progress.

Decatur, Chesapeake & New Orleans.—Tracklaying on this road was commenced at Fayetteville, Tenn., on July 26, and is now being vigorously pushed in opposite directions, north toward Shelbyville, Tenn., and south toward Decatur, Ala. Grading and trestling is nearly all completed on about 34 miles between Fayetteville and Shelbyville. The preliminary surveys have been finished for the entire line, and the locating survey has been made for a considerable distance. W. H. Calhoun, of Fayetteville, Tenn., is Chief Engineer.

Dexter & Piquette.—Tracklaying has been commenced at Dexter, Me., and will now proceed until completed to Foxcroft, 16½ miles distant. It is expected to reach this point by Sept. 15.

Empire & Dublin.—Tracklaying has been completed to within six miles of Dublin, Ga., on the extension of this road to that city. Right of way has not yet been secured through Dublin, but it is expected that this will be obtained very soon.

Evansville & Richmond.—It is announced that all work east of Azalia, Ind., is to be discontinued, as the route has been again changed, so that the road will pass through Columbus, Ind., as at first proposed. The \$70,000 recently appropriated by Columbus is not available, owing to the non-fulfillment of the terms of the agreement (on the part of the railroad company), which secured the donation.

Tracklaying was commenced Aug. 2 at Bedford, Ind., and is being continued toward Ellettsburg. Tracklaying from Bedford to Seymour will be commenced this week.

Fairhaven & Southern.—It is stated that Nelson Bennett, president of this road, has made an arrangement with the Bellingham Bay & British Columbia road, by which he will complete that road from New Westminster, B.C., to a connection with the Fairhaven & Southern. For this, the subsidy of \$100,000 voted in New Westminster is to be transferred to this company. About 12 miles of the Bellingham Bay & British Columbia road is completed. The Fairhaven & Southern has been completed from Fairhaven for some miles south, and rolling stock has been placed upon it. It is now proposed to build north from some point near Fairhaven or Whatcom to New Westminster.

Fort Madison & Northwestern.—On Sept. 10 a hearing will be held in the United States Supreme Court at Keokuk, Ia., on a motion filed by the Union Trust Co. of New York asking the Court to direct the discontinuance of road on the ground that a large debt is growing against the property; that it does not pay even operating expenses; that a considerable expenditure is immediately required to improve the condition of the road; that the receivership is in debt without means and financial credit, and that the interests involved do not justify the continued and increasing burden imposed by the operation of the road.

Fort Worth & Rio Grande.—The tracklaying is now completed for 12 miles from Granbury toward Stephenville, Tex. The section between Stephenville and Dublin, on the Houston & Texas Central, is now being cross-sectioned, and grading will soon be commenced.

Galena, Guthrie & Western.—Charter filed in Kansas, by J. W. Morrison, D. C. Fenn and others.

It is proposed to construct a railroad from Galena south-easterly via Baxter Springs through the Indian Territory by the most practicable route to Guthrie, I. T. The estimated length is 200 miles. The capital stock is \$1,000,000. The headquarters of the company are in Baxter Springs, Kan.

Gauley & Eastern.—This company has been chartered in West Virginia to construct a railroad from the mouth of Gauley River to Huntersville, Pocahontas County, W. Va., through one of the finest coal and timber regions of the state.

Georgia.—Bills are pending in the legislature for the incorporation of the following railroad companies: The Oostanula & Coasawater, the Bainbridge & Northeastern, the Augusta & West Florida and the Georgia Railway & Banking Co.

Georgia, Carolina & Northern.—Contracts for grading 50 miles west from Chester, N. C., were let last week, and more will be let in September.

The following are the contractors, beginning at Chester and going westward: Robert Halliburton, Chester, S. C., 6 miles; Stewart, Sullivan & Co., Chester, S. C., 3 miles; C. D. Langhorne, Richmond, Va., 5 miles; Murdock & Calvin, Columbia, S. C., masonry at Broad River; M. J. Condon & Co., Knoxville, Tenn., 10 miles; Greysone, Granite & Construction Co., Raleigh, N. C., 3 miles; L. Wright & Co., Richmond, Va., 8 miles; Griffith & Limberger, Memphis, Tenn., 6 miles; S. Holmhouse & Co., Clinton, S. C., 4 miles; A. & C. Wright, Rusk, N. C., 5 miles. These contracts take the line five miles beyond Clinton, S. C.

Green Bay, Winona & St. Paul.—As has been anticipated the last few weeks, the company defaulted the interest on its first mortgage bonds this week. A plan has been proposed, which, if adopted, it is believed can prevent the road from going into the hands of a receiver. It is intended to build the Southwestern extension, known as the Winona & Southwestern road, from Winona to Omaha. To raise funds for doing this, it is proposed to assess the preferred and common stocks 5 per cent., and the income bonds 10 per cent. The Lackawanna Coal & Iron Company, and the Delaware, Lackawanna & Western, are the largest interests, and they have signified their approval of the scheme for the extension.

Ithaca, Auburn & Western.—This road is to be sold under foreclosure decree Aug. 23. It extends from Auburn to Freeville, N. Y., a distance of 39 miles, and it has not paid interest on the bonds for some time.

Kansas City & Excelsior Springs.—Right of way has been nearly all obtained for this road, which it is proposed to build from Excelsior Springs to Missouri City, Mo., nine miles, and connecting at the latter place with the Wabash. Two routes have been located from Excelsior Springs, one to Coolidge Lake, eight miles, and the other to Missouri City, nine miles, both connecting with the Wabash. Trains will be run from the Kansas City Union Depot over the Wabash to the connection with this road and thence to Excelsior Springs, about 30 miles. Hammett & Davison, of Kansas City, are interested.

Kinderhook & Hudson.—Proposals for the grading and bridging on this road will be received until Aug. 17 at

Watertown, N. Y., where plans and specifications may be seen. The line, as surveyed, extends from Hudson, Columbia County, N. Y., to Stottville, Stockport, Stuyvesant Falls, Kinderhook, Valatie and thence to Kinderhook station, N. Y., on the Boston & Albany. The line connects with the Boston & Albany at both termini. Construction is to be commenced at once, a portion of the grading being already done. The line is about 18 miles in length. The tracklaying will be done by Moffett, Hodgkins & Clarke, of Watertown. There will be used 56 lbs. steel rails, and either yellow pine, chestnut or white oak sleepers. Ties to be 8 ft. in length, 6 in. in thickness and 7 in. face if hewed, 8 in. face if sawed.

Money for the construction of this road is furnished by a syndicate of Watertown capitalists, Moffett, Hodgkins & Clarke, of that city, representing the majority.

Lockport & Northern.—The company has secured the right of way for about eight miles from Lockport, but has met with some difficulty in securing the remaining five miles. It is stated that if the right of way can be secured the work of grading will be immediately commenced. The road is projected to extend from Newfane station, on the Rome, Watertown & Ogdensburg, westerly to Lockport, N. Y. It is thought, if the road is built, the Rome, Watertown & Ogdensburg will use it to secure an entrance into Buffalo, entering that city over the tracks of the New York, Lake Erie & Western.

Louisiana, North & South.—F. A. Walker and I. Holston, of Gibsland, La., are contractors for the extension of this road south 8 miles from Gibsland, La., referred to last week. The company expects to build about 18 miles of new road this year.

Louisville, Hardinsburg & Western.—A mortgage for \$630,000, to the American Loan & Trust Co. of New York, is being recorded in Kentucky. The mortgage is on the road from Lexington to Fordville, 37 miles. It is intended to build to Hartford when the road is finished to Fordville, and possibly to Mt. Henry, on the Chesapeake, Ohio & Southwestern. Tracklaying has been begun at Irvington.

Macon & Birmingham.—The preliminary survey has been finished from Macon, Ga., to Birmingham, 230 miles, and the locating survey has been completed to Culloden, Ga. The route passes through a good mineral country, and a good grade is said to have been secured.

Mexican.—An extraordinary meeting of this company, was called for Aug. 1, at London, to consider a proposition to construct a branch about 30 miles long from Irolo, on the main line, to Pachuca, an important mining centre. There is at present a narrow-gauge railroad between the two points, but the proposed branch "is intended for protective purposes." The project is expected to cost about £90,000, the money for which may be taken from the government subvention which is applicable to improvements.

Mexican Southern.—A formal transfer of the concession for this road has been made by H. Rudston Read, of London, the concessionaire, to the Mexican Southern Railway Co. The road is well under survey, and contracts for most of the eastern part will be opened for bids next week.

This line will extend from Puebla, Mex., to Tehuantepec, passing the city of Oaxaca. It includes the larger part of the lines originally granted to Gen. Grant. After the failure of Gen. Grant to carry out the terms of his concessions, they passed into the hands of the Governor of the state of Oaxaca, and from him, after various amendments, to Mr. H. R. Read, of the firm of Read & Campbell, Mexico and London, by whom they were transferred to the Mexican Southern Railway Co., of London. This company is required to construct the portion from Puebla to Oaxaca in six years, and the remaining portion to Tehuantepec in four years more. The contract for the complete construction and equipping of the first portion has been let to Messrs. Read & Campbell, under whom surveys are now actively in progress preparatory to beginning grading at once.

The road will be of 3-ft. gauge, solidly constructed, with masonry and iron bridges, 50-lb. steel rails, and with steel ties for two-thirds of its length. The Mexican government agrees to pay, as a subsidy to this enterprise, \$2,400 per year, for 15 years.

This is a larger subsidy than has been before given in Mexico, but the government undoubtedly thinks it warranted to give railroad communications to the rich and influential state of Oaxaca, which has so far been left out in the railroad development of the country, on account of its difficulty of access. The estimated length of the road is: Puebla to Oaxaca, 240 miles; Oaxaca to Tehuantepec, 200 miles, a total of 440 miles. At Puebla it will connect with the Inter-oceanic road, of the same gauge, and through this line it will have a connection with the Mexican National, and thus the narrow-gauge system of Mexico will have connections even superior to the present standard-gauge system.

Milbank, Egan and Sioux City.—N. B. Dare, of Minneapolis, is soon to begin the survey for this road from Milbank to Palisade, Dak., 90 miles, and he will commence work this month.

Mississippi Valley.—Grading for this road was commenced this week at Tallulah, La., just north of the Vicksburg, Shreveport & Pacific road, by John Scott & Sons, of St. Louis, the contractors.

Napanee, Tamworth & Quebec.—Connection has been made at Harrowsmith, Ont., between this road and the Kingston & Pembroke. The company is meeting with difficulty in sinking a coffer-dam at Yorker, in the Napanee River. Until it is secured the large bridge, which is to span the river, cannot be built. Grading between the river and Harrowsmith has been completed and tracklaying commenced from the Harrowsmith end, and it is expected that by Aug. 15 the road will be ready for use. The extension from Tamworth north to Tweed, Ont., 20 miles, is also being rapidly pushed. Six hundred men are at work along the different points and considerable tracklaying has been done at both ends. Two miles have been finished at the Tamworth end, and it is expected that the road will be completed from Tweed to Stoco within one month.

New Orleans, Natchez & Ft. Scott.—It is claimed that the contract will be let Sept. 1 next for building this road from Natchez, Miss., north to Rayville, La., and that the contract from Rayville north to Oak Ridge and the Arkansas state line will be let Jan. 1, 1891. This latter line will be built by a company called the North Louisiana & Texas, of which H. A. N. F. of Bastrop, La., is Secretary.

New Roads.—A survey is soon to be made by William E. King for a proposed road from Byram's Cove to Stockholm, Sussex County, N. J., where connection would be made with the New York, Susquehanna & Western. The proposed new road will be about nine miles long. W. M. Forbes, of Newark, N. J., is the projector.

Press dispatches state that a company will be organized to build a proposed road from Jasper, the terminus of the Evansville division of the Louisville & St. Louis Air Line, to Gosport, Ind., a distance of over 75 miles.

A preliminary survey has been made for a proposed road from Onawa, Monona County, southeast to Dunlap, Harrison County, Ia., about 30 miles.

New York, Fort Wayne & Chicago.—This proposed road, referred to last week as organized to build a road from Fort Wayne to Chicago, has filed articles of incorporation in Indiana, with a capital stock placed at \$1,500,000.

Norfolk & Western.—The company is about to consolidate with some of its auxiliary companies, including the Norfolk Terminal, and will create a consolidated mortgage on the terminal facilities at Norfolk and Lambert's Point, Va., now the property of the Norfolk Terminal Co., and also a first mortgage on the Ohio and North Carolina extensions to be constructed. The mortgage will also provide for the ultimate refunding at a lower rate of interest of all underlying liens, a large part of which mature or may be redeemed during the next 11 years, and will therefore become in time a first mortgage upon the entire system. The new bonds will not be offered for some time.

It is stated that the company will build a 5 mile branch from its Cripple Creek division, in Virginia, to the mines of the New York & Virginia Mineral Co.

Northern Pacific & Manitoba.—The 60 days option which this company had on the franchise of the Great Northwest Central has been allowed to lapse. The company made full inquiries and investigated the value of the charter and found that the bargain would not turn out as satisfactory, if concluded, as had been expected. The Dominion Government also would not promise to locate the land grant in advance of construction, and after full consideration the company decided to allow the 60 days option to expire. The negotiations with the Manitoba & Northwestern are also off. The company will confine itself to the development of the system now built and under construction.

On the Morris & Brandon extension tracklaying has been completed for a distance of 35 miles, and the line will be open to traffic in three weeks. The Portage extension is completed to that point, and will be opened for business as soon as the terminal arrangements have been made.

Omaha, Lincoln & Gulf.—Charter filed in Nebraska to build a road 1,000 miles long from Omaha through Nebraska, Kansas, Indian Territory and Texas, to a point on the Gulf of Mexico. The capital stock is placed at \$12,000,000.

Oxford & New Glasgow.—The Department of Railways & Canals, at Ottawa, will this week open bids for tracklaying and ballasting this line from Oxford Village, Nova Scotia, to Mingo Road.

Pennsylvania, Lehigh & Eastern.—The transfer of the franchise and other property was completed this week, the deeds of conveyance being recorded in various counties in Pennsylvania.

Philadelphia & Reading.—The company has just finished widening the distance between the tracks on the East Pennsylvania road to 7 ft. Work will shortly be begun at double tracking the remainder of the road between Blandon and Albury, Pa., 16 miles.

Pittsburgh & Mansfield.—This company was incorporated in Pennsylvania, Aug. 5, to build a road from a point at or near the intersection of Main and Walnut (or Wabash) street, in the 36th Ward, Pittsburgh, Pa., to a point at or near the intersection of Fourth avenue and Second street, in the borough of Chartiers, Allegheny County, Pa. The length is five miles, and the capital stock is \$50,000.

Pittsburgh & West.—This company has recently been making many improvements in its road bed, and has this year used nearly 2,000 tons of rails in building new sidings. Much real estate has been acquired, including property at Painesville, O.; Fairport, New Castle Junction and the Willow Grove property, near Pittsburgh, which, with additional ground along the Allegheny River front, will give room for large yards.

Quebec & Lower Province.—This company has given notice that application will be made at the next session of the Quebec Legislature for an act of incorporation to construct and operate a road from a point on the River St. Lawrence, at or near the town of Lévis, in the district of Quebec, connecting with the proposed bridge across the St. Lawrence, and thence through the districts of Quebec and Beauce, to a junction with the Canadian Pacific short line, at or near Lake Magentic.

Rochester & Honeoye Valley.—This company, whose road runs from Rochester to Honeoye Falls, N. Y., has been granted permission by the State Board of Railroad Commissioners to increase its capital stock from \$320,000 to \$500,000.

Redondo.—It is expected to complete the tracklaying on this road this week from Los Angeles to Redondo Beach, Cal., on the Pacific Coast, a distance of about 20 miles. The grading was done by the Los Angeles Construction Co. The road is free of debt, the money for constructing it being provided from stock subscriptions, and no bonds have yet been issued. The Laclede Car Mfg. Co., of St. Louis, have the contract for building the cars for this road and will have them all delivered in three weeks.

Rome & Decatur.—The sale of the road will take place Nov. 20 in New York. This is one of the properties involved in the failure of Ives & Staylor. Connecting with the Memphis & Charleston at Decatur, Ala., it crosses into Georgia to Rome, which is its present terminus. Surveys and right of way have been obtained to continue the road through to Gainesville, Ga., where it will connect with the Richmond & Danville, which combination, it is believed, will bid in the road on the day of the sale.

St. Louis Elevated.—The Scott Elevated Railroad bill has passed the House of Delegates. The elevated road will be 17 miles long. The contract for the iron work has been let to the Phoenix Iron Co., of Pittsburgh, who will begin work on the material for the structure immediately. The road has been bonded for \$3,000,000.

San Antonio & Aransas Pass.—An application for the appointment of a receiver was made last week to the District Court at San Antonio, Tex., by Christopher Kiel, a former contractor, who claims he holds a promissory note of the company for \$9,000, past due. The petitioner alleges that the road is mortgaged for \$11,000,000, and that it is soon to be sold. The General Manager denies these statements, and says that the total indebtedness is not one-half the amount stated, and the greater part of that is not due. The road has no authority to issue mortgage bonds amounting to more than \$10,000 per mile on a portion of the road, and \$12,000, the limit, on the remainder.

A strike of freight trainmen on the road stopped traffic a week.

San Francisco & North Pacific.—The Sonoma Valley branch, extending from Ignacio, on the main line east and north to Glen Ellen, Cal., 26 miles, is to be changed to standard gauge at an expense of \$70,000. The company

will also build a branch from Santa Rosa, Cal., northwest to Sebastopol, six and a half miles, at a cost of \$175,000. This branch will be completed this year. About four miles of road owned by the Sonoma Valley Lumber Company extending from Guerneville, the terminus of the branch from Finton into redwood forests, has been purchased by this company and will be operated hereafter as part of this branch. The money for these improvements and extensions is provided from the sale of bonds recently issued.

San Juan & Southern.—This company has been organized in Montrose, Col., to build a road from Dallas, 20 miles above Montrose, on the Ouray branch of the Denver & Rio Grande, via Telluride to Rico, a distance of over 60 miles. Articles of incorporation will soon be filed. The surveys will be commenced immediately, and it is stated that grading will be commenced this fall. The road will, if built, open up a good mineral country, which has not been developed as much as possible on account of the lack of railroad facilities.

Savannah, Americus & Montgomery.—On the extension from Abbeville east to Savannah, the grading has now been completed from Abbeville to McRae, on the East Tennessee, Virginia & Georgia, 25 miles. Between McRae and the Oconee River, 20 miles there are about 200 teams and 500 men at work. The bridge and trestle builders are within about ten miles of McRae and tracklaying will begin shortly.

Savannah & Western.—J. F. Miller, who built the first few miles of this road from Eden, Ga., west to the Ogeechee River, has been given a contract for building from the Ogeechee River to Sterling, Ga. This makes about 70 miles of the extension from Eden now under contract. Wright & Strother have the contract to build from the Ogeechee River to the Ogeechee River.

Seattle Central.—Grading has been commenced on this standard gauge road, which it is proposed to build from Union Bay, Lake Washington, through the city of Seattle, Wash., to Dunlap, on the southern end of Lake Washington. The survey for the line has been completed, but the company has not as yet been incorporated. The following are directors of the company: President, A. C. Thompson, of San Francisco; G. Morris Haller, Thomas Burke and Angus Mackintosh, of Seattle.

Seattle & Northern.—It is announced that as soon as the company completes the first 20 miles on this road, from Ship Harbor, on Puget Sound, eastward toward the Cascade Mountains, it will cease work for a time. Over 2,500 men are now grading on the first section. The Oregon Improvement Co. is furnishing the funds for building the road.

Sedalia, Warsaw & Southern.—A large force of men is at work replacing all the old ties of this road with new ones of standard gauge length. New bridges are also being built of the same width as for a standard gauge road, and many other improvements are being made to the permanent w. y. This has given rise to the belief that the road will soon be made standard gauge. It is a part of the Missouri Pacific, and extends from Sedalia to Warsaw, a distance of 42 miles.

Shepang, Litchfield & Northern.—Subscriptions amounting to \$20,000 have been secured by the company from residents in Litchfield County, Conn., and it is now claimed that work will begin on the extension from New Preston to Lake Wampanoag, Conn., at once. The distance is about four miles, but it is estimated that it will cost nearly \$70,000 to build the line.

South Carolina.—The following plan of reorganization for the company has been announced. All the old securities are to be deposited with the Central Trust Co., New York, each depositor paying in cash 10 per cent. of the amount of his deposited securities; the floating debt is to be paid or purchased by the committee; on reorganization being completed first mortgage bondholders are to receive 5 per cent. bonds at par, or cash with accrued interest at will; second mortgage bondholders will receive at par new cumulative preferred stock bearing 5 per cent. dividends, and holders of income bonds or common stock are to receive new stock to the amount of 60 per cent. of their holdings. The outside limit of new preferred stock issue is \$2,500,000. Considerable opposition to the plan has been developed.

South Easton & Phillipsburg.—A charter has been granted in New Jersey to this company to build a road one mile long from South Easton, Northampton County, to the boundary line between Pennsylvania and New Jersey. The capital is \$75,000.

Southern Pacific.—The company recently placed orders for rails for completing 129 miles of road in San Luis Obispo and Santa Barbara counties, and 208 miles in San Joaquin County. In the first two counties the coast division will be pushed, and in San Joaquin County lines will be completed from Oakdale, Stanislaus County, 108 miles to Sanger, in Fresno, and also from Tracy, San Joaquin County, southward and west of Fresno City to Armona, in Tulare County, and thence to Bakersfield.

The route has been surveyed, complete right of way obtained, and the contracts let, for the building of a road from Palms, Cal., to Port Ballona, a distance of about six miles. This will give the Southern Pacific a third outlet to the coast in Southern California from Los Angeles.

Trains are now running to Beeville, Texas, tracklaying having been completed to that point from Victoria, 55 miles.

Spokane Falls & Northern.—The tracklayers on this road have reached a point beyond Dragon Creek, a distance of 41 miles from Spokane Falls, W. T. Track is expected to be laid as far as Colville, W. T., by September 10.

Staunton & West Augusta.—The preliminary survey for this road was recently completed from Staunton, Va., via Churchville and Stirling Springs to coal fields in North River Gap, 25 miles. The maximum grade is 2 per cent.; there will be much heavy rock work and four summit cuts. R. N. Pool, of Staunton, is President.

Tampa & West Coast.—The preliminary survey has been finished for this road, which is to be built from Tampa, Fla., west 22 miles to the Gulf coast. Capt. E. B. Carter is Chief Engineer.

Templeton Phosphate.—This company will apply for incorporation at the next session of the Canadian Legislature. It proposes to construct a road from the Ottawa River, near the village of East Templeton, Ottawa, northerly, a distance of about 15 miles; also to build a road starting at a point on this line in the township of Templeton, near Perkins Mills, and running in a westerly direction to a point in the township of Wakefield, a distance of about 15 miles. The capital stock will be \$50,000. The city of Montreal will be the chief place of business of the company.

Tennessee & Ohio.—The East Tennessee, Virginia & Georgia having acquired the ownership of the Tennessee & Ohio, the property was, on July 29, transferred to that company.

Terminal Railroad Association of St. Louis.—The stockholders of the Union Railway Transit Co., the Terminal Railroad Co., and the Union Depot Co., of St. Louis, have voted to lease their property to this company, which was organized in St. Louis last May to acquire and organize into one company the railroad terminal property in the city. The roads directly concerned in this new corporation are the Missouri Pacific, the St. Louis, Iron Mountain & Southern, the St. Louis, Vandalia & Terre Haute, the Indianapolis & St. Louis, the Ohio & Mississippi, the Wabash and the Louisville & Nashville, and each will hold one-seventh of the stock. The company will issue \$7,000,000 4½ per cent. bonds, and will use part of the money thus secured in building a new station in the city.

Toledo, Columbus & Cincinnati.—The survey for the southern extension of this road was commenced at Findlay, Ohio, last week under J. C. Williams, Engineer in Charge. From Findlay lines will be run to Forest and to Kenton, Hardin County. The survey will proceed slowly, and Columbus will not be reached for some time.

Victoria, Saanich & New Westminster.—At a meeting of the City Council, Victoria, B. C., it was decided to rescind the by-law granting assistance to this road in its present form. At the next meeting of the council a by-law will be introduced providing aid to this company by granting to the company a bonus of interest at the rate of 4 per cent. on \$500,000 for 25 years. Also to provide for the city corporation taking 3,750 shares at \$100 each in capital stock and for the exemption of the company's property within the city of Victoria, from all municipal taxation for a period of 10 years and for granting for the uses of the company a full supply of water free of charge for a like term of 10 years.

Vincennes, Oakland City & Owensboro.—J. D. Powers, who was awarded the contract to build this road, surrendered his contract Aug. 2. It is announced that the directors will advertise for bids to build the road, and the contract will be let to the lowest bidder.

Wabash.—At a recent meeting of the stockholders of the Eastern and Western divisions, the consolidation of the Toledo Western, the Detroit & State Line, the Wabash, the Wabash Eastern of Indiana and of Illinois, and the Wabash Western, under the name of Wabash Railroad Co., was formally approved. Articles of incorporation were subsequently filed in the various states through which the road passes, the capital stock being placed at \$52,000,000.

Washington & Idaho.—Fully 2,000 men are at work on this line. About one-fifth of the grading is completed from Rockford, Wash. Terr., to the timber line, a distance of 30 miles. There has been very heavy work in Ploof Gulch, where it has been necessary to do an immense amount of blasting through very hard blue granite. Tracklaying is in progress from Tekoa East. It is expected to have the extension from Rockford to Spokane Falls done by Sept. 1.

Wyoming, Salt Lake & California.—Grading is now in progress on this road between Park City, Utah, and the Wyoming state line, and it is hoped to have it completed before October. It is contemplated to build a 1,000-ft. tunnel in Emigration Canyon, and engineers are now surveying for it, and will soon decide whether it is practicable.

Youghiogheny Connecting.—Chartered in Pennsylvania, to build from McKeesport to Thomas Station, in Millin Township, on the Pittsburgh, Virginia & Charleston, in Allegheny County. Commencing at McKeesport, in said county, thence along the eastern bank of the Youghiogheny River in the borough of the McKeesport, thence through McKeesport in a northerly and easterly direction and across the Monongahela River at Riverton street, in McKeesport, to a point in Millin Township in said county, thence through Millin Township along the western bank of the Monongahela River to Thomas Station, in Millin Township, on the Pittsburgh, Virginia & Charleston Railroad. The distance is five miles, all located in Allegheny County. The capital stock is \$50,000.

Youghiogheny Southern.—This company has been chartered in Pennsylvania to build a road, commencing on the southerly side of Youghiogheny River, in Fayette County, Pa., at or near a point opposite Broad Ford, and thence extending generally in a southwestwardly direction to a point at or near Uniontown, in the county of Fayette. The length of the road will be about 20 miles. The capital stock is \$200,000. H. C. Frick, Pittsburgh, is President.

TRAFFIC.

Traffic Notes.

The Union Pacific recently took 13 carloads of starch westward in one lot.

A Cincinnati dispatch of Aug. 1 states that the Cincinnati, Hamilton & Dayton on that day took an excursion of 80 cars to Niagara Falls.

The Wabash has reduced hard coal rates from Toledo to the Missouri River 25 cents per ton, the new price being \$3.55.

Harvest excursion tickets put on sale in Chicago for a trip to be begun on Aug. 6 only were handled by scalpers, they making a one-way rate of \$15 to Denver, thus, by the aid of Denver brokers, being able to make a profit of \$4 on each round trip, the tickets costing \$26.

The lake and rail lines have advanced the rate on flour from Minneapolis to eastern seaboard points five cents per 100 lbs. The all-rail lines will probably make a corresponding increase.

The differentials allowed the Canadian Pacific by the Trans-Continental Association are now as below, the agreement being for three months. The table shows the new and old differentials in classes in cents per 100 lbs., to apply on San Francisco business only:

Class.	1	2	3	4	5	A	B	C	D	E
Chicago:										
Present.....	25	21	17	14	11	11	9	7	7	7
Agreed.....	17.5	14.5	12	10	8	8	7	5	5	5
Atlantic seaboard:										
Present.....	40	35	25	20	15	15	12	10	7.5	7.5
Agreed.....	28	24	17	14	12	12	8	8	5	5

The St. Paul differentials remain unchanged. Inquiry having been made whether the New York dressed beef rates could be used to Boston upon dressed beef exported from Boston, answer has been given by Chairman Hayden and Vice-Chairman Blanchard of the Joint Committee that the New York rates would, in that event, be the proper charge to Boston, subject to the usual proofs of export.

Prorating Between the Seaboard and St. Paul.

The Chicago Committee of the Central Traffic Association, in refusing to join in through rates between New York and St. Paul on the basis of 75 cents, first class, makes a long statement of its reasons, which may be briefly summarized as follows: 1. It is unjust to reduce on traffic strictly competitive with the Soo Line, and not reduce from other points, like Pittsburgh, also. 2. Points between Chicago and St. Paul should also have the benefit of the low rates, for the same reason. 3. Such an important and extensive change should not be made on so short a notice as 30 days. 4. The proportion proposed by the Northwestern roads is unfair. On flour, the amount

accruing to the roads west of Chicago is proposed to be changed from 15 cents to 20 cents per barrel. 5. On some classes the rates from Chicago eastward would have to be reduced. 6. Rates from Peoria and other points southwest of Chicago, being on a certain percentage above Chicago, would be unjustly high, as compared with St. Paul. 7. It does not appear that proper efforts have been made to induce the northern lines to compromise. If those lines should reduce below 75 cents, the proposed remedy would be ineffectual. 8. Proper persuasion has not been brought to bear on the eastern lines which handle the business that goes over the Soo Line and Canadian Pacific.

The Chicago & Alton's Relations with its Competitors.

The withdrawal of the Chicago & Alton from the Interstate Commerce Railway Association, and the various phases of its controversy with the other lines between Chicago and Kansas City, have been much discussed the past week. The prominent officers of the Alton, Rock Island and Atchison roads have been interviewed at considerable length. The talk has hinged mostly on the methods used by the Alton to secure traffic from points West of Kansas City, and Chairman Walker has issued a report on a complaint made by the Rock Island against the Alton, which it seems was filed over a month ago. The complaint avers that the Alton has issued a so-called tariff of through rates from Rock Island points west of the Missouri to Chicago, without the permission of the Rock Island, no joint tariff having been agreed upon. It is claimed that the billing of live stock from Kansas City to Chicago at these reduced rates, which for that portion of the route are less than what are charged on live stock shipped at Kansas City, are illegal; the notice issued by the Alton being, in fact, not a lawful tariff. Chairman Walker finds that this so-called tariff makes no rates whatever, but simply undertakes to apply from Rock Island stations the through rates to Chicago which are specified in Chairman Midgley's tariff, but Midgley's tariff has a paragraph stating that the rates are good only on the Rock Island; Chairman Walker therefore believes the tariff to be illegal, and that its publication was in violation of the act to regulate commerce, and he will refer the matter to the Interstate Commerce Commission.

The Atchison, Topeka & Santa Fe has notified Chairman Midgley that it will, for the protection of its interests, hereafter make through rates on live stock to Chicago only over its own system. The letter of Traffic Manager White points out that nearly all of his competitors have pursued this policy heretofore, but that he refrained from adopting it as long as possible. General Manager Chappell, of the Chicago & Alton, says that his road will withdraw from the Western Freight Association as soon as the Atchison issues the threatened new tariff.

Decision Regarding Foreign-Built Cars.

The Secretary of the Treasury has issued his decision on the question submitted to him by the Collector of Customs at Detroit, Mich., as to foreign built cars coming into the United States. The decision, addressed to the Collector of Customs at Detroit, is as follows:

The Department has fully considered the questions submitted by you of the dutiable or non-dutiable character of foreign-built railway cars coming into the United States and Canada, laden, or for the purpose of being laden with mails, passengers, baggage, express matter, or freight.

The records of this department show that railway cars engaged in the so-called transit trade, partly over the territory of the United States, and partly over the territory of Canada, have never been regarded as subject to import duty, but simply as vehicles of transportation for the conducting of an established and legalized traffic.

In letters from this department to the President of the New York Central Railway Co., Feb. 2, 1889, to the Collector at Port Huron, April 27, 1870, and to the Collector at Burlington, Dec. 3, 1878, and Jan. 9, 1882, it was held that such practice was not obnoxious to the revenue laws of the United States, and did not subject foreign-built cars running in the transit trade between Canada and the United States to duty, since Section 3, 102, Revised Statutes, authorizes foreign railway cars laden with importations to enter the United States, and proceed to destination, and Section 3,006, Revised Statutes, authorizes the cars of both countries to engage in international traffic, and the merchandise so carried to be treated as "if the transportation had taken place entirely within the limits of the United States."

The principle so adopted and announced has remained in force for more than 20 years, and does not seem to have been impeached or questioned in or by any statute or other congressional action, or any judicial decision or treaty or any departmental regulations or restrictions in all that time, it being considered that the action taken by the Department Jan. 3, 1889, and which action was recalled and rescinded before the same had taken effect, did not amount to a disturbance or impeachment of the otherwise unbroken practice. In view of the long settled rule and practice upon the subject, the Department does not deem it conformable to the public interest to disturb the decision deliberately reached and repeatedly affirmed, and must hold that the question is no longer open to administrative construction.

It only remains to advise you that, while these rulings are adhered to in deference to the reasonable requirements of commerce, not to permit such practice to degenerate into a license for the free importation of foreign-built railroad cars into the domestic traffic of the United States under cover of the established usage described in the preceding paragraphs.

W. WINDOM, Secretary.

East-Bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, Aug. 3, amounted to 52,812 tons, against 49,289 tons during the preceding week, an increase of 3,523 tons, and against 43,040 tons during the corresponding week of 1888, an increase of 9,792 tons. The proportions carried by each road were:

	Wk to Aug. 3.		Wk to July 27.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....	6,295	11.9	5,111	10.4
Wabash.....	2,171	4.1	2,275	4.8
Lake Shore & Michigan South.	10,115	19.2	9,174	18.6
Pitts., Ft. Wayne & Chicago....	5,143	9.7	6,217	12.6
Chicago, St. Louis & Pitts.....	4,956	9.4	4,771	9.7
Baltimore & Ohio.....	3,069	5.8	2,650	5.4
Chicago & Grand Trunk.....	11,919	22.6	11,625	23.6
New York, Chic. & St. Louis....	4,019	7.6	3,587	7.3
Chicago & Atlantic.....	5,134	9.7	3,879	7.8
Total.....	52,812	100.0	49,289	100.0

Of the above shipments 4,643 tons were flour, 13,950 tons grain, 3,393 tons millstuf, 6,268 tons cured meats, 1,869 tons lard, 8,890 tons dressed beef, 1,313 tons butter, 1,987 tons hides, 613 tons wool, and 5,232 tons lumber. The three Vanderbilt lines together carried 38.7 per cent. of all the business, while the two Pennsylvania lines carried 19.1 per cent.